TEST REPORT

Dt&C

DT&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC1907-0210
2. Customer
   - Name : QUCELLNetworks Company Limited.
   - Address : 3F,Innowireless Building,190,Seohyeon-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : QO-64-48B / SC-220
   FCC ID : 2AS48SC-220
5. Test Method Used : ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01v03r01, KDB 940660 D01v02, KDB 662911 D01v02r01, KDB 662911 D02v01
   Test Specification : §2, §96
6. Date of Test : 2019.04.19 ~ 2019.06.17
7. Testing Environment : Refer to appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by Name: Inhee Bae (Signature)	Reviewed by Name: Jaejin Lee (Signature)

2019 . 07 . 02 .

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1907-0210	Jul. 02, 2019	Initial issue

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1 GENERAL INFORMATION

Applicant Name	:	QUCELLNetworks Company Limited.
Address	:	3F,Innowireless Building,190,Seohyeon-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea
FCC ID	:	2AS48SC-220
FCC Classification	:	Citizens Band Category A Device (CBD)
EUT	:	QO-64-48B
Model Name	:	SC-220
Add Model Name	:	N/A
Supplying power	:	DC 48 V
Antenna Information	:	Internal Cross-Polarized Antenna (4 Antennas)
Antenna Gain	:	Antenna 1: 13.28 dBi Antenna 2: 13.41 dBi Antenna 3: 13.11 dBi Antenna 4: 13.37 dBi

Device

-	End User Device
v	Category A CBSD
-	Category B CBSD

- MIMO configuration of EUT

MIMO	Transmit antenna
Case 1	Antenna 1 and 2 Note1
Case 2	Antenna 3 and 4 Note1

Note1: This device supports the multiple transmitting and the transmitting antennas are cross-polarized.

- LTE CA Band48 Carrier aggregation Configurations

The EUT, Mobile Digital station, 3.55-3.7 GHz, (B48), is part of a LTE broadband fixed cellular wireless access system. The total number of RF Paths is 4 and the total number of Antennas is 4.
Antenna type is a Cross-Polarized antenna, uncorrelated between Carriers and between Paths of each carrier.
The configuration is as follows.

Carrier	RF Path	Antenna
Carrier 1(PCC)	Path 1	Antenna 1
	Path 2	Antenna 2
Carrier 2(SCC)	Path 3	Antenna 3
	Path 4	Antenna 4

Note: This device supports LTE single transmitting and LTE up-link carrier aggregation (Intra-band).
The supporting UL-CA combination are as below.

▪ LTE CA_intra-band_continuous

Range	CC-Combo / N_{RB_agg} [RB]	CC1			CC2		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]	BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Low	50 + 50	50	55290	3555	50	55690	3565
	50 + 100	50	55295	3555.5	100	55439	3569.9
		100	55340	3560	50	55484	3574.4
	100 + 100	100	55340	3560	100	55538	3579.8
Mid	50 + 50	50	55940	3620	50	56040	3630
	50 + 100	50	55896	3615.6	100	56040	3630
		100	55941	3620.1	50	56085	3634.5
	100 + 100	100	55891	3615.1	100	56089	3634.9
High	50 + 50	50	56590	3685	50	56690	3695
	50 + 100	50	56496	3675.6	100	56640	3690
		100	56541	3680.1	50	56685	3694.5
	100 + 100	100	56442	3670.2	100	56640	3690

▪ **LTE CA_intra-band_non-continuous**

Test Frequency ID	CC-Combo / N_{RB_agg} [RB]	CC1			Wgap [MHz]	CC2		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Max Wgap	50 + 50	50	55290	3555	130	50	56690	3695
	50 + 100	50	55290	3555	120	100	56640	3690
		100	55340	3560	120	50	56690	3695
	100 + 100	100	55340	3560	110	100	56640	3690

- Emission Designator and Max power (MIMO_Ant1 & Ant2)

Mode	TX Frequency (MHz)	Modulation	Emission Designator	EIRP Note (dBm/OBW)	EIRP (dBm/10MHz)	PSD (dBm/MHz)
LTE Band 48	3560 ~ 3690	QPSK	17M9G7D	31.11	28.58	19.41
LTE Band 48	3560 ~ 3690	16QAM	17M9W7D	31.03	28.51	19.32
LTE Band 48	3560 ~ 3690	64QAM	17M9W7D	31.02	28.56	19.33
LTE Band 48	3555 ~ 3695	QPSK	8M96G7D	-	28.07	19.49
LTE Band 48	3555 ~ 3695	16QAM	8M98W7D	-	27.96	19.37
LTE Band 48	3555 ~ 3695	64QAM	8M95W7D	-	28.02	19.41

Note: The total EIRP was measured across the entire OBW of the signal.

- Emission Designator and Max power (MIMO_Ant3 & Ant4)

Mode	TX Frequency (MHz)	Modulation	Emission Designator	EIRP Note (dBm/OBW)	EIRP (dBm/10MHz)	PSD (dBm/MHz)
LTE Band 48	3560 ~ 3690	QPSK	17M9G7D	31.89	29.31	19.78
LTE Band 48	3560 ~ 3690	16QAM	17M9W7D	32.01	29.39	19.87
LTE Band 48	3560 ~ 3690	64QAM	17M9W7D	31.97	29.32	19.75
LTE Band 48	3555 ~ 3695	QPSK	8M94G7D	-	28.12	19.29
LTE Band 48	3555 ~ 3695	16QAM	8M98W7D	-	28.20	19.33
LTE Band 48	3555 ~ 3695	64QAM	8M94W7D	-	28.26	19.41

Note: The total EIRP was measured across the entire OBW of the signal.

- Emission Designator and Max power (UL-CA, intra-band_continuous)

Mode	TX Frequency (MHz)	Modulation	Emission Designator	EIRP Note (dBm/OBW)	EIRP (dBm/10MHz)	PSD (dBm/MHz)
10MHz+10MHz	3555 ~ 3695	QPSK	17M9G7D	30.87	28.26	19.51
10MHz+10MHz	3555 ~ 3695	16QAM	17M9W7D	30.74	28.15	19.42
10MHz+10MHz	3555 ~ 3695	64QAM	17M9W7D	30.72	28.21	19.48
10MHz+20MHz	3555.5 ~ 3690	QPSK	26M9G7D	32.81	29.19	19.87
10MHz+20MHz	3555.5 ~ 3690	16QAM	27M0W7D	32.94	29.25	19.83
10MHz+20MHz	3555.5 ~ 3690	64QAM	26M9W7D	32.96	29.33	19.97
20MHz+10MHz	3560 ~ 3694.5	QPSK	26M9G7D	31.93	27.87	19.36
20MHz+10MHz	3560 ~ 3694.5	16QAM	26M9W7D	32.10	28.01	19.45
20MHz+10MHz	3560 ~ 3694.5	64QAM	26M9W7D	31.96	27.94	19.33
20MHz+20MHz	3560 ~ 3690	QPSK	35M8G7D	34.37	29.47	19.96
20MHz+20MHz	3560 ~ 3690	16QAM	35M9W7D	34.32	29.48	19.89
20MHz+20MHz	3560 ~ 3690	64QAM	35M9W7D	34.47	29.53	19.98

Note: The total EIRP was measured across the entire OBW of the signal.

- Emission Designator and Max power (UL-CA, intra-band_non-continuous)

Mode	TX Frequency (MHz)	Modulation	Emission Designator	EIRP Note (dBm/OBW)	EIRP (dBm/10MHz)	PSD (dBm/MHz)
10MHz+10MHz	3555 ~ 3695	QPSK	17M9G7D	26.07	26.07	17.38
10MHz+10MHz	3555 ~ 3695	16QAM	17M9W7D	25.97	25.97	17.30
10MHz+10MHz	3555 ~ 3695	64QAM	17M9W7D	25.95	25.95	17.31
10MHz+20MHz	3555.5 ~ 3690	QPSK	26M8G7D	31.16	28.77	19.94
10MHz+20MHz	3555.5 ~ 3690	16QAM	26M9W7D	31.28	28.68	19.86
10MHz+20MHz	3555.5 ~ 3690	64QAM	26M8W7D	31.04	28.70	19.88
20MHz+10MHz	3560 ~ 3694.5	QPSK	26M8G7D	30.58	28.11	19.62
20MHz+10MHz	3560 ~ 3694.5	16QAM	26M9W7D	30.60	28.09	19.54
20MHz+10MHz	3560 ~ 3694.5	64QAM	26M8W7D	30.67	28.19	19.68
20MHz+20MHz	3560 ~ 3690	QPSK	35M8G7D	31.39	28.64	19.99
20MHz+20MHz	3560 ~ 3690	16QAM	35M9W7D	31.34	28.58	19.90
20MHz+20MHz	3560 ~ 3690	64QAM	35M8W7D	31.30	28.56	19.93

Note: The total EIRP was measured across the entire OBW of the signal.

2 INTRODUCTION

2.1 EUT DESCRIPTION

The Equipment under Test (EUT) supports LTE (Band48).

2.2 EUT CAPABILITIES

This ETU contains the following capabilities:

- 2 x 2 MIMO
- LTE CA (Intra-Band)

2.3 TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+21 ℃ ~ +25 ℃
▪ Relative Humidity	39 % ~ 45 %

2.4 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.5 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Radiated Disturbance (Below 1 GHz)	5.1 dB (The confidence level is about 95 %, k = 2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.4 dB (The confidence level is about 95 %, k = 2)
Radiated Disturbance (Above 18 GHz)	5.3 dB (The confidence level is about 95 %, k = 2)

2.6 TEST FACILITY

DT&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.
The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014.
- FCC MRA Accredited Test Firm No. : KR0034

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3 SUMMARY OF TEST RESULTS

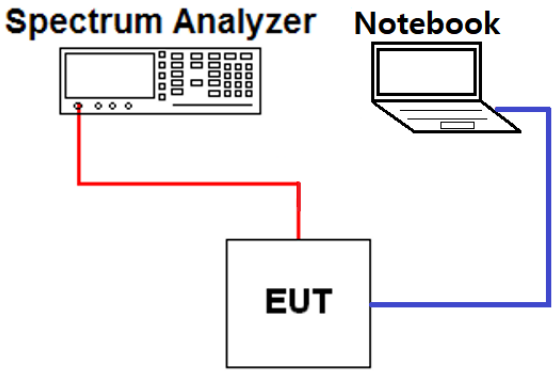
FCC Part Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
2.1046	Conducted Channel Power	N/A	Conducted	C
2.1049	Occupied Bandwidth	N/A		C Note2
96.41(g)	Peak to Average Ratio	< 13 dB		C
2.1051 96.41(e)	Band Edge / Conducted Spurious Emissions	Within 0 MHz to 10 MHz above and below the assigned channel ≤ -13 dBm/MHz Greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz Any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz		C
2.1055	Frequency Stability	Within the authorized frequency band		C
96.41(b)	Maximum Effective Isotropic Radiated Power(EIRP)	End User Device: < 23dBm/10MHz Category A CBSD: < 30dBm/10MHz Category B CBSD: < 47dBm/10MHz		C
96.41(b)	Maximum Power Spectral Density	End User Device: N/A Category A CBSD: < 20dBm/MHz Category B CBSD: < 37dBm/MHz		C
2.1053 96.41	Undesirable Emissions	Any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz		C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable
Note 2: For contiguous intra-band carrier aggregation, was measured occupied BW across component carriers and measured power.
For non-contiguous intra-band carrier aggregation, was summed of measured occupied bandwidths of the individual carriers.

4 DESCRIPTION OF TESTS

4.1 OCCUPIED BANDWIDTH.

Test set-up



Test Procedure

- **KDB971168 D01v03 - Section 4.3**
- **ANSI C63.26-2015 – Section 5.4.4**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

Test setting

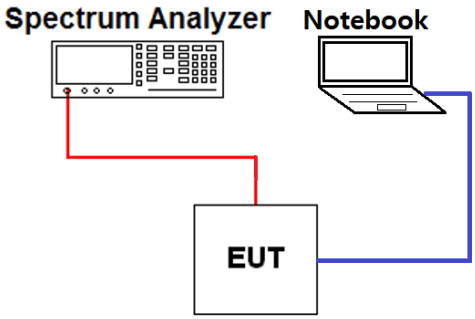
1. The signal analyzer`s automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 ~ 5 % of the expected OBW & VBW ≥ 3 X RBW
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 ~ 5 % of the 99 % occupied bandwidth observed in step 6.

Limit

NA

4.2 BAND EDGE EMISSIONS(Conducted)

Test set-up



Test Procedure

- **KDB971168 D01v03 - Section 6**
- **ANSI C63.26-2015 – Section 5.7**

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

Test setting

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1MHz
4. VBW ≥ 3 X RBW
5. Detector = RMS & Trace mode = Max hold
6. Sweep time = Auto couple or 1 s
7. Number of sweep point ≥ 2 X span / RBW
8. The trace was allowed to stabilize

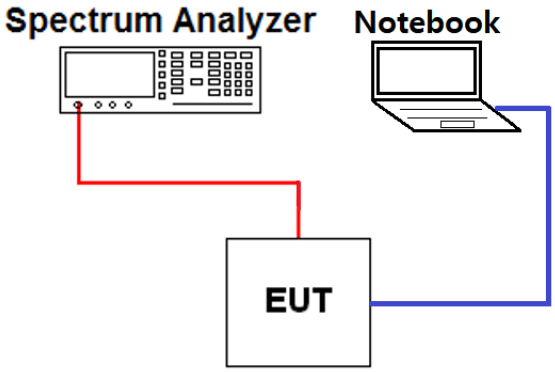
Note: Part 96.41(e)(3)(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full reference bandwidth (i.e., 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Limit

Part 96.41(e)(1) General protection levels. Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed −25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.
(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

4.3 SPURIOUS AND HARMONIC EMISSIONS(Conducted)

Test set-up



Test Procedure

- **KDB971168 D01v03 - Section 6**
- **ANSI C63.26-2015 – Section 5.7**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 9 kHz up to a frequency including its 10^{th} harmonic.

Test setting

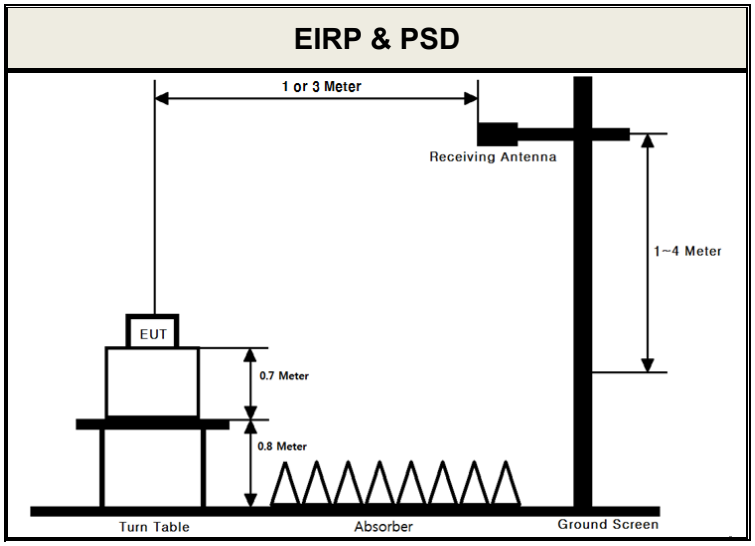
1. RBW = 1 MHz & VBW ≥ 3 X RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple or 1 s
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

Limit

Part 96.41(e)(2)The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

4.4 MAXIMUM EIRP (Equivalent Isotropic Radiated Power) & MAXIMUM PSD

Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections.

Test Procedure for EIRP

- **ANSI/TIA-603-E-2016 - Section 2.2.17**
- **KDB971168 D01v03 - Section 5.2.2**
- **ANSI C63.26-2015 – Section 5.2.4.4.2**

Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1% to 5% of the OBW.
3. Set VBW ≥ 3 x RBW.
4. Set number of points in sweep ≥ 2 × span / RBW.
5. Sweep time:
   1) Set = auto-couple, or
   2) Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. Set sweep trigger to “free run”
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

11. Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25%.

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A horn antenna was substituted in place of the EUT. This horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

The EIRP is calculated using the following formula:

EIRP = The conducted power at the substitute antenna`s terminal [dBm] + Substitute Antenna gain [dBi for EIRP]

Test Procedure for PSD

- **KDB971168 D01v03 - Section 5.4**
- **ANSI C63.26-2015 – Section 5.2.4.5**

Test setting

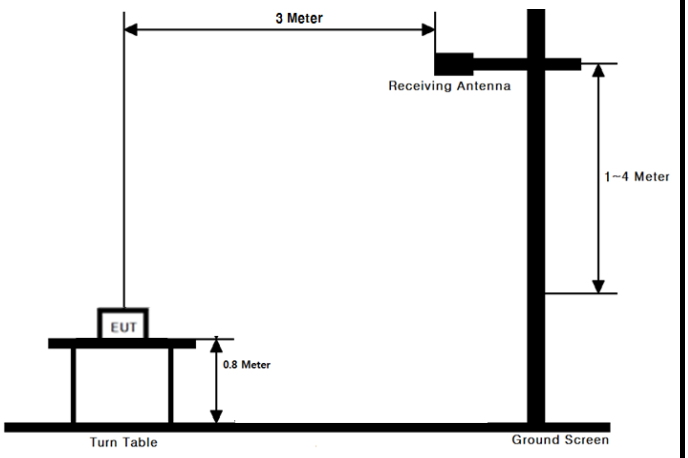
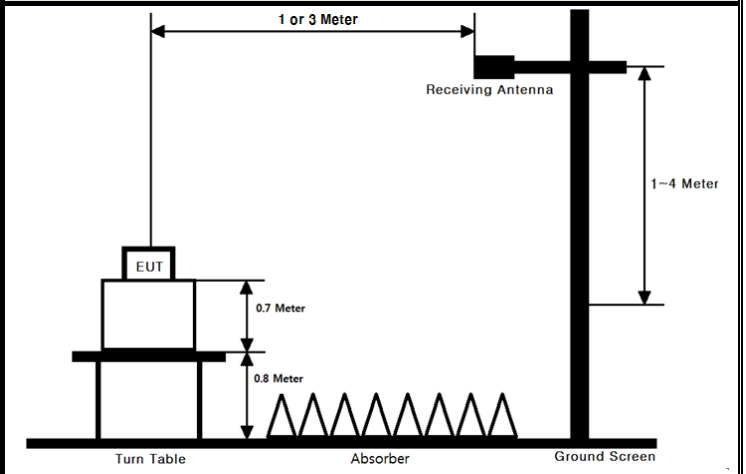
1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1MHz
3. Set VBW ≥ 3 x RBW.
4. Set number of points in sweep ≥ 2 × span / RBW.
5. Sweep time:
   1) Set = auto-couple, or
   2) Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. Set sweep trigger to “free run”
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
9. Use the peak search function on the instrument to find the peak of the spectrum.
10. Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25%.

Limit

Device	Maximum EIRP (dBm/10MHz)	Maximum PSD (dBm/MHz)
End User Device	23	N/A
Category A CBSD	30	20
Category B CBSD	47	37

4.5 UNDESIRABLE EMISSIONS

Test Set-up

Below 1GHz	Above 1GHz
	

These measurements were performed at 3 test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- **ANSI/TIA-603-E-2016 - Section 2.2.12**
- **KDB971168 D01v03 - Section 5.8**
- **ANSI C63.26-2015 – Section 5.5**

Test setting

1. RBW = 1 MHz & VBW ≥ 3 X RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple or 1 s
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

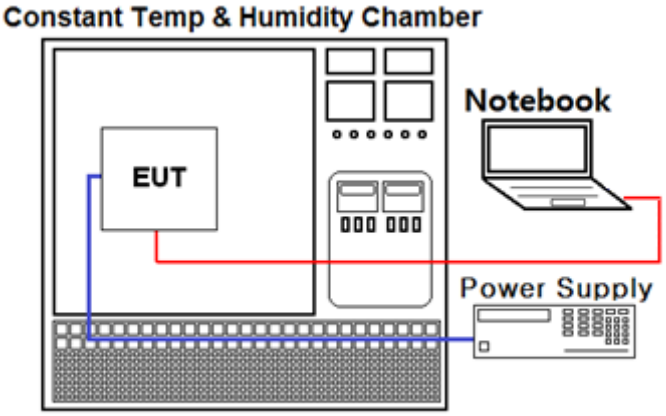
The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.
For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.
For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.

Limit

Part 96.41(e)(2)The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

4.7 FREQUENCY STABILITY

Test Set-up



Test Procedure

- **ANSI/TIA-603-E-2016**
- **KDB971168 D01v03 - Section 9**

The frequency stability of the transmitter is measured by:

a.) **Temperature:**
The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:**
The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature.
(20 °C to provide a reference)
2. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.
A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Limit

Within the authorized frequency band

5 LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Rohde Schwarz	FSW67	18/08/16	19/08/16	104037
Spectrum Analyzer	Agilent Technologies	N9020A	18/07/09	19/07/09	MY50410163
Spectrum Analyzer	Agilent Technologies	N9020A	18/07/09	19/07/09	MY46471251
DC power supply	H.P	6633A	18/12/28	19/12/28	3524A06634
Multimeter	FLUKE	17B	18/12/18	19/12/18	26030065WS
Termination	Siga Tek	1402	18/07/04	19/17/04	1
Termination	Siga Tek	1402	18/07/04	19/17/04	2
Termination	Siga Tek	1402	18/07/04	19/17/04	3
Temp & Humi	SJ Science	SJ-TH-S50	18/07/06	19/07/06	U5542113
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-2
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-1
Signal Generator	Rohde Schwarz	SMBV100A	18/12/19	19/12/19	255571
Signal Generator	Anritsu	MG3695C	18/12/20	19/12/20	173501
Loop Antenna	Schwarzbeck	FMZB1513	18/01/30	20/01/30	1513-128
Bilog Antenna	Schwarzbeck	VULB 9160	18/07/03	19/07/03	3359
Dipole Antenna	Schwarzbeck	VHA9103	18/04/13	20/04/13	2117
Dipole Antenna	Schwarzbeck	UHA9105	18/04/13	20/04/13	2262
HORN ANT	ETS	3117	18/05/10	20/05/10	00140394
HORN ANT	A.H.Systems	SAS-574	17/07/31	19/07/31	155
PreAmplifier	H.P	8447D	18/12/18	19/12/18	2944A07774
PreAmplifier	Agilent	8449B	18/07/05	19/07/05	3008A02108
PreAmplifier	A.H.Systems Inc.	PAM-1840VH	18/07/06	19/07/06	163
High-pass filter	Wainwright	WHNX5.0	18/07/05	19/07/05	8
Cable	Radiall	TESTPRO3	19/01/16	20/01/16	M-01
Cable	DTNC	Cable	19/01/16	20/01/16	M-04
Cable	Junkosha	MWX315	19/01/16	20/01/16	M-05
Cable	Junkosha	MWX221	19/01/16	20/01/16	M-06
Cable	Junkosha	MWX241	19/01/14	20/01/14	G-04
Cable	DTNC	Cable	19/01/15	20/01/15	RF-65

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.
Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

6 SAMPLE CALCULATION

A. Emission Designator

LTE Band 48(QPSK)

Emission Designator = **17M9G7D**
LTE OBW = 17.948 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(16QAM)

Emission Designator = **17M9W7D**
LTE OBW = 17.934 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(64QAM)

Emission Designator = **17M9W7D**
LTE OBW = 17.944 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(QPSK)_LTE CA_continuous

Emission Designator = **35M8G7D**
LTE OBW = 35.844 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(16QAM)_LTE CA_continuous

Emission Designator = **35M9W7D**
LTE OBW = 35.876 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(64QAM)_LTE CA_continuous

Emission Designator = **35M9W7D**
LTE OBW = 35.882 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(QPSK)_LTE CA_non-continuous

Emission Designator = **35M8G7D**
LTE OBW = 35.820 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(16QAM)_LTE CA_non-continuous

Emission Designator = **35M9W7D**
LTE OBW = 35.852 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 48(64QAM)_LTE CA_non-continuous

Emission Designator = **35M8W7D**
LTE OBW = 35.849 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

B. For substitution method

EIRP for Band 48

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm/10MHz)	Limit (dBm/10MHz)
20 MHz	3560	QPSK	100/0	H	20.25	8.33	28.58	30.00

ERP or EIRP = Level @ Ant Terminal LEVEL(dBm) + Tx Ant. Gain

1) The EUT mounted on a non-conductive turntable is 1.5 meter above test site ground level.
2) During the test, the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with substituted antenna gain is the rating of ERP, EIRP or Radiated spurious emission.

7 TEST DATA

7.1 CHANNEL POWER(Condcuted)

▪ **Band 48 Channel Power (MIMO_Ant1 & Ant2)**

Channel Power [dBm]				
RB Allocation			FULL RB	
B.W[MHz]	Freq.[MHz]	Modulation	ANT1	ANT2
20M	3560	QPSK	15.39	14.86
		16QAM	15.36	14.83
		64QAM	15.29	14.78
	3625	QPSK	14.31	14.54
		16QAM	14.66	14.93
		64QAM	14.45	15.16
	3690	QPSK	13.99	14.25
		16QAM	13.87	14.26
		64QAM	14.05	13.79
10M	3555	QPSK	11.62	12.09
		16QAM	11.92	12.04
		64QAM	11.87	12.03
	3625	QPSK	11.25	12.04
		16QAM	11.31	12.09
		64QAM	11.05	12.04
	3695	QPSK	10.49	10.85
		16QAM	10.60	10.96
		64QAM	10.64	11.30

▪ **Band 48 Channel Power (MIMO_Ant3 & Ant4)**

Channel Power [dBm]				
RB Allocation			FULL RB	
B.W[MHz]	Freq.[MHz]	Modulation	ANT3	ANT4
20M	3560	QPSK	14.91	15.00
		16QAM	15.10	15.04
		64QAM	14.78	14.91
	3625	QPSK	15.00	15.23
		16QAM	14.94	15.26
		64QAM	14.95	15.26
	3690	QPSK	14.62	14.60
		16QAM	14.62	14.55
		64QAM	14.61	14.52
10M	3555	QPSK	11.31	11.54
		16QAM	11.40	11.45
		64QAM	11.35	11.55
	3625	QPSK	11.41	11.51
		16QAM	11.42	11.48
		64QAM	11.30	11.41
	3695	QPSK	11.06	10.93
		16QAM	11.10	10.90
		64QAM	11.08	10.91

▪ **Band 48 (UL-CA, intra-band_continuous)**

Channel Power [dBm]							
RB Allocation				FULL RB			
B.W [MHz]	PCC Frequency [MHz]	SCC Frequency [MHz]	Modulation	PCC		SCC	
				ANT1	ANT2	ANT3	ANT4
10 MHz / 10 MHz	3555	3565	QPSK	11.58	12.03	11.51	11.39
			16QAM	11.67	11.48	11.48	11.38
			64QAM	11.62	11.96	11.56	11.43
	3620	3630	QPSK	10.76	11.66	11.40	11.50
			16QAM	10.79	11.96	11.38	11.43
			64QAM	10.97	11.97	11.23	11.41
	3685	3695	QPSK	10.70	11.02	10.97	10.91
			16QAM	10.64	10.93	10.87	10.82
			64QAM	10.47	11.03	10.77	10.81
10 MHz / 20 MHz	3555.5	3569.9	QPSK	11.79	12.18	15.07	15.07
			16QAM	11.03	11.13	14.83	14.62
			64QAM	11.07	12.07	14.93	14.93
	3615.6	3630	QPSK	10.84	12.08	15.01	15.06
			16QAM	11.13	12.17	14.98	15.13
			64QAM	10.80	11.95	14.93	15.29
	3675.6	3690	QPSK	10.15	10.49	14.52	14.67
			16QAM	10.25	10.87	14.49	14.74
			64QAM	10.35	10.94	14.49	14.52
20 MHz / 10 MHz	3560	3574.4	QPSK	14.67	14.82	11.44	11.31
			16QAM	14.65	15.02	11.31	11.17
			64QAM	14.82	14.87	11.40	11.11
	3620.1	3634.5	QPSK	14.34	14.96	11.26	11.57
			16QAM	14.37	15.12	11.37	11.48
			64QAM	14.27	15.10	11.26	11.46
	3680.1	3694.5	QPSK	13.82	13.90	11.08	11.16
			16QAM	13.86	13.90	11.10	11.09
			64QAM	13.81	13.97	10.97	11.04
20 MHz / 20 MHz	3560	3579.8	QPSK	14.89	14.86	14.82	14.67
			16QAM	14.87	14.45	14.93	14.54
			64QAM	14.69	14.87	14.76	14.68
	3615.1	3634.9	QPSK	14.51	14.72	14.94	15.08
			16QAM	14.61	14.96	14.97	15.02
			64QAM	14.27	15.01	14.91	15.01
	3670.2	3690	QPSK	13.84	14.40	14.68	14.69
			16QAM	14.39	14.37	14.62	14.50
			64QAM	14.05	14.08	14.53	14.62

Band 48 (UL-CA, intra-band_non continuous)

Channel Power [dBm]							
RB Allocation				FULL RB			
B.W [MHz]	PCC Frequency [MHz]	SCC Frequency [MHz]	Modulation	PCC		SCC	
				ANT1	ANT2	ANT3	ANT4
10 MHz / 10 MHz	3555	3695	QPSK	11.45	12.19	11.13	11.25
			16QAM	11.24	12.14	10.97	11.14
			64QAM	11.34	12.19	11.12	11.16
10 MHz / 20 MHz	3555	3690	QPSK	11.15	12.08	14.72	14.74
			16QAM	11.08	11.48	14.66	14.86
			64QAM	11.30	11.90	14.68	14.77
20 MHz / 10 MHz	3560	3695	QPSK	14.37	15.00	11.23	11.15
			16QAM	14.75	14.83	11.04	11.23
			64QAM	14.82	15.07	11.28	11.13
20 MHz / 20 MHz	3560	3690	QPSK	14.40	14.98	14.55	14.61
			16QAM	14.80	14.92	14.34	14.63
			64QAM	14.85	14.87	14.64	14.59

7.2 MAXIMUM EIRP

▪ **Band 48 (MIMO: Ant1 & Ant2)**

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm/10MHz)	Limit (dBm/10MHz)
20M	3560	QPSK	100/0	H	20.25	8.33	28.58	30.00
		16QAM	100/0	H	20.18	8.33	28.51	
		64QAM	100/0	H	20.23	8.33	28.56	
	3625	QPSK	100/0	H	20.08	8.36	28.44	
		16QAM	100/0	H	19.94	8.36	28.30	
		64QAM	100/0	H	19.96	8.36	28.32	
	3690	QPSK	100/0	H	20.14	8.38	28.52	
		16QAM	100/0	H	20.12	8.38	28.50	
		64QAM	100/0	H	20.02	8.38	28.40	
10M	3555	QPSK	50/0	H	19.75	8.32	28.07	
		16QAM	50/0	H	19.64	8.32	27.96	
		64QAM	50/0	H	19.70	8.32	28.02	
	3625	QPSK	50/0	H	19.51	8.36	27.87	
		16QAM	50/0	H	19.56	8.36	27.92	
		64QAM	50/0	H	19.61	8.36	27.97	
	3695	QPSK	50/0	H	19.57	8.38	27.95	
		16QAM	50/0	H	19.50	8.38	27.88	
		64QAM	50/0	H	19.51	8.38	27.89	

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP Note (dBm/OBW)	Limit (dBm)
20M	3560	QPSK	100/0	H	22.78	8.33	31.11	NA
		16QAM	100/0	H	22.70	8.33	31.03	
		64QAM	100/0	H	22.69	8.33	31.02	
	3625	QPSK	100/0	H	22.69	8.36	31.05	
		16QAM	100/0	H	22.42	8.36	30.78	
		64QAM	100/0	H	22.61	8.36	30.97	
	3690	QPSK	100/0	H	22.64	8.38	31.02	
		16QAM	100/0	H	22.61	8.38	30.99	
		64QAM	100/0	H	22.52	8.38	30.90	

Note: The total EIRP was measured across the entire OBW of the signal.

▪ **Band 48 (MIMO: Ant3 & Ant4)**

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm/10MHz)	Limit (dBm/10MHz)
20M	3560	QPSK	100/0	H	20.60	8.33	28.93	30.00
		16QAM	100/0	H	20.47	8.33	28.80	
		64QAM	100/0	H	20.62	8.33	28.95	
	3625	QPSK	100/0	H	20.95	8.36	29.31	
		16QAM	100/0	H	21.03	8.36	29.39	
		64QAM	100/0	H	20.96	8.36	29.32	
	3690	QPSK	100/0	H	20.92	8.38	29.30	
		16QAM	100/0	H	20.74	8.38	29.12	
		64QAM	100/0	H	20.89	8.38	29.27	
10M	3555	QPSK	50/0	H	19.80	8.32	28.12	
		16QAM	50/0	H	19.88	8.32	28.20	
		64QAM	50/0	H	19.94	8.32	28.26	
	3625	QPSK	50/0	H	19.56	8.36	27.92	
		16QAM	50/0	H	19.82	8.36	28.18	
		64QAM	50/0	H	19.61	8.36	27.97	
	3695	QPSK	50/0	H	19.63	8.38	28.01	
		16QAM	50/0	H	19.58	8.38	27.96	
		64QAM	50/0	H	19.85	8.38	28.23	

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP Note (dBm/OBW)	Limit (dBm)
20M	3560	QPSK	100/0	H	22.84	8.33	31.17	NA
		16QAM	100/0	H	23.34	8.33	31.67	
		64QAM	100/0	H	23.08	8.33	31.41	
	3625	QPSK	100/0	H	23.53	8.36	31.89	
		16QAM	100/0	H	23.65	8.36	32.01	
		64QAM	100/0	H	23.61	8.36	31.97	
	3690	QPSK	100/0	H	23.40	8.38	31.78	
		16QAM	100/0	H	23.52	8.38	31.90	
		64QAM	100/0	H	23.56	8.38	31.94	

Note: The total EIRP was measured across the entire OBW of the signal.

▪ **Band 48 (UL-CA, intra-band_continuous)**

B.W [MHz]	PCC Freq. [MHz]	SCC Freq. [MHz]	PCC Modulation	PCC RB Size/ Offset	SCC RB Size/ Offset	Result (dBm/10MHz)	Limit (dBm/10MHz)
10 MHz / 10 MHz	3555	3565	QPSK	50/0	50/0	28.26	30.00
			16QAM	50/0	50/0	28.15	
			64QAM	50/0	50/0	28.21	
	3620	3630	QPSK	50/0	50/0	28.16	
			16QAM	50/0	50/0	28.09	
			64QAM	50/0	50/0	28.06	
	3685	3695	QPSK	50/0	50/0	28.25	
			16QAM	50/0	50/0	28.01	
			64QAM	50/0	50/0	28.15	
10 MHz / 20 MHz	3555.5	3569.9	QPSK	50/0	100/0	28.92	
			16QAM	50/0	100/0	28.69	
			64QAM	50/0	100/0	28.67	
	3615.6	3630	QPSK	50/0	100/0	29.19	
			16QAM	50/0	100/0	29.25	
			64QAM	50/0	100/0	29.33	
	3675.6	3690	QPSK	50/0	100/0	29.09	
			16QAM	50/0	100/0	29.02	
			64QAM	50/0	100/0	28.60	
20 MHz / 10 MHz	3560	3574.4	QPSK	100/0	50/0	27.42	
			16QAM	100/0	50/0	27.41	
			64QAM	100/0	50/0	27.28	
	3620.1	3634.5	QPSK	100/0	50/0	27.87	
			16QAM	100/0	50/0	28.01	
			64QAM	100/0	50/0	27.94	
	3680.1	3694.5	QPSK	100/0	50/0	27.83	
			16QAM	100/0	50/0	27.99	
			64QAM	100/0	50/0	27.91	
20 MHz / 20 MHz	3560	3579.8	QPSK	100/0	100/0	29.04	
			16QAM	100/0	100/0	28.86	
			64QAM	100/0	100/0	29.07	
	3615.1	3634.9	QPSK	100/0	100/0	29.47	
			16QAM	100/0	100/0	29.48	
			64QAM	100/0	100/0	29.53	
	3670.2	3690	QPSK	100/0	100/0	29.24	
			16QAM	100/0	100/0	29.41	
			64QAM	100/0	100/0	29.43	

▪ **Band 48 (UL-CA, intra-band_non-continuous)**

B.W [MHz]	PCC Freq. [MHz]	SCC Freq. [MHz]	PCC Modulation	PCC RB Size/ Offset	SCC RB Size/ Offset	PCC Result (dBm/10MHz)	SCC Result (dBm/10MHz)	Limit (dBm/MHz)
10 MHz / 10 MHz	3555	3695	QPSK	50/0	50/0	25.89	26.07	30.00
			16QAM	50/0	50/0	25.77	25.97	
			64QAM	50/0	50/0	25.74	25.95	
10 MHz / 20 MHz	3555	3690	QPSK	50/0	100/0	27.80	28.77	
			16QAM	50/0	100/0	27.69	28.68	
			64QAM	50/0	100/0	27.74	28.70	
20 MHz / 10 MHz	3560	3695	QPSK	100/0	50/0	27.80	28.77	
			16QAM	100/0	50/0	27.69	28.68	
			64QAM	100/0	50/0	27.74	28.70	
20 MHz / 20 MHz	3560	3690	QPSK	100/0	100/0	28.20	28.64	
			16QAM	100/0	100/0	28.10	28.58	
			64QAM	100/0	100/0	28.13	28.56	

7.3 MAXIMUM PSD(Radiated)

▪ **Band 48 (MIMO_Ant1 & Ant2)**

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	PSD (dBm/MHz)	Limit (dBm/MHz)
20M	3560	QPSK	100/0	H	11.08	8.33	19.41	20.00
		16QAM	100/0	H	10.99	8.33	19.32	
		64QAM	100/0	H	11.00	8.33	19.33	
	3625	QPSK	100/0	H	10.76	8.36	19.12	
		16QAM	100/0	H	10.85	8.36	19.21	
		64QAM	100/0	H	10.81	8.36	19.17	
	3690	QPSK	100/0	H	10.84	8.38	19.22	
		16QAM	100/0	H	10.92	8.38	19.30	
		64QAM	100/0	H	10.94	8.38	19.32	
10M	3555	QPSK	50/0	H	11.17	8.32	19.49	
		16QAM	50/0	H	11.05	8.32	19.37	
		64QAM	50/0	H	11.09	8.32	19.41	
	3625	QPSK	50/0	H	11.10	8.36	19.46	
		16QAM	50/0	H	10.84	8.36	19.20	
		64QAM	50/0	H	10.95	8.36	19.31	
	3695	QPSK	50/0	H	10.97	8.38	19.35	
		16QAM	50/0	H	10.88	8.38	19.26	
		64QAM	50/0	H	10.91	8.38	19.29	

▪ **Band 48 (MIMO: Ant3 & Ant4)**

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	PSD (dBm/MHz)	Limit (dBm/MHz)
20M	3560	QPSK	100/0	H	10.78	8.33	19.11	20.00
		16QAM	100/0	H	10.95	8.33	19.28	
		64QAM	100/0	H	11.02	8.33	19.35	
	3625	QPSK	100/0	H	11.42	8.36	19.78	
		16QAM	100/0	H	11.51	8.36	19.87	
		64QAM	100/0	H	11.39	8.36	19.75	
	3690	QPSK	100/0	H	11.33	8.38	19.71	
		16QAM	100/0	H	11.36	8.38	19.74	
		64QAM	100/0	H	11.35	8.38	19.73	
10M	3555	QPSK	50/0	H	10.97	8.32	19.29	
		16QAM	50/0	H	11.01	8.32	19.33	
		64QAM	50/0	H	11.09	8.32	19.41	
	3625	QPSK	50/0	H	10.78	8.36	19.14	
		16QAM	50/0	H	10.67	8.36	19.03	
		64QAM	50/0	H	10.83	8.36	19.19	
	3695	QPSK	50/0	H	10.73	8.38	19.11	
		16QAM	50/0	H	10.77	8.38	19.15	
		64QAM	50/0	H	10.87	8.38	19.25	

7.4 OCCUPIED BANDWIDTH

- Plots of the EUT's Occupied Bandwidth are shown in Clause 8.1

7.5 PEAK TO AVERAGE RATIO (Conducted)

- Plots of the EUT's Peak to Average Ratio are shown in Clause 8.2

7.6 BAND EDEG EMISSIONS (Conducted)

- Plots of the EUT's Band Edge Emissions are shown in Clause 8.3

7.7 SPURIOUS AND HARMONICS EMISSIONS (Conducted)

- Plots of the EUT's Spurious Emissions are shown in Clause 8.4

7.8 UNDESIRABLE EMISSIONS (Radiated)

▪ **Band 48 (MIMO: Ant1 & Ant2)**

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
20	3560	100/0	QPSK	7119.56	H	-67.76	11.47	-56.29	-40.00	16.29
				7120.53	V	-67.71	11.47	-56.24	-40.00	16.24
10	3555	100/0	QPSK	7110.23	H	-67.50	11.45	-56.05	-40.00	16.05
				7111.28	V	-67.22	11.46	-55.76	-40.00	15.76

Note 1: Limit = -40dBm/MHz
Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.
Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

▪ **Band 48 (MIMO:: Ant3 & Ant4)**

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
20	3560	100/0	16QAM	7251.07	H	-66.74	11.53	-55.21	-40.00	15.21
				7250.86	V	-67.43	11.53	-55.90	-40.00	15.90
10	3555	50/0	64QAM	7108.93	H	-67.18	11.45	-55.73	-40.00	15.73
				7109.67	V	-67.55	11.45	-56.10	-40.00	16.10

Note 1: Limit = -40dBm/MHz
Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.
Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

▪ **Band 48 (UL-CA, intra-band_continuous)**

B.W (MHz)	PCC /SCC	Frequency (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
10 MHz / 10 MHz	PCC	3555	50/0	QPSK	7109.87	H	-66.74	11.45	-55.29	-40.00	15.29
					7110.34	V	-67.21	11.45	-55.76	-40.00	15.76
	SCC	3565	50/0	QPSK	7128.66	H	-67.21	11.48	-55.73	-40.00	15.73
					7131.26	V	-67.29	11.48	-55.81	-40.00	15.81
10 MHz / 20 MHz	PCC	3615.6	50/0	64QAM	7230.47	H	-66.77	11.51	-55.26	-40.00	15.26
					7231.53	V	-67.26	11.51	-55.75	-40.00	15.75
	SCC	3615.6	100/0	64QAM	7260.20	H	-66.96	11.54	-55.42	-40.00	15.42
					7259.25	V	-67.49	11.54	-55.95	-40.00	15.95
20 MHz / 10 MHz	PCC	3620.1	100/0	16QAM	7241.17	H	-67.49	11.52	-55.97	-40.00	15.97
					7238.91	V	-67.56	11.52	-56.04	-40.00	16.04
	SCC	3634.5	1/50	16QAM	7268.32	H	-66.71	11.55	-55.16	-40.00	15.16
					7267.91	V	-67.40	11.55	-55.85	-40.00	15.85
20 MHz / 20 MHz	PCC	3615.1	100/0	64QAM	7231.23	H	-67.48	11.51	-55.97	-40.00	15.97
					7230.65	V	-67.46	11.51	-55.95	-40.00	15.95
	SCC	3634.9	100/0	64QAM	7270.89	H	-67.13	11.56	-55.57	-40.00	15.57
					7270.43	V	-67.06	11.55	-55.51	-40.00	15.51

Note 1: Limit = -40dBm/MHz

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

▪ **Band 48 (UL-CA, intra-band_non-continuous)**

B.W (MHz)	PCC /SCC	Frequency (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
10 MHz / 10 MHz	PCC	3555	50/0	QPSK	7110.10	H	-67.55	11.45	-56.10	-40.00	16.10
					7108.84	V	-67.34	11.45	-55.89	-40.00	15.89
	SCC	3695	50/0	QPSK	7391.00	H	-66.95	11.69	-55.26	-40.00	15.26
					7390.02	V	-67.48	11.69	-55.79	-40.00	15.79
10 MHz / 20 MHz	PCC	3555	50/0	QPSK	7109.19	H	-66.88	11.45	-55.43	-40.00	15.43
					7108.55	V	-67.47	11.45	-56.02	-40.00	16.02
	SCC	3690	100/0	QPSK	7378.65	H	-66.83	11.68	-55.15	-40.00	15.15
					7380.74	V	-67.02	11.68	-55.34	-40.00	15.34
20 MHz / 10 MHz	PCC	3560	100/0	64QAM	7119.60	H	-66.77	11.47	-55.30	-40.00	15.30
					7118.54	V	-67.34	11.47	-55.87	-40.00	15.87
	SCC	3695	1/50	64QAM	7389.85	H	-66.57	11.69	-54.88	-40.00	14.88
					7390.49	V	-66.71	11.69	-55.02	-40.00	15.02
20 MHz / 20 MHz	PCC	3560	100/0	QPSK	7121.08	H	-67.14	11.47	-55.67	-40.00	15.67
					7120.42	V	-67.41	11.47	-55.94	-40.00	15.94
	SCC	3690	100/0	QPSK	7381.49	H	-66.88	11.68	-55.20	-40.00	15.20
					7380.78	V	-67.16	11.68	-55.48	-40.00	15.48

Note 1: Limit = -40dBm/MHz

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

7.9 FREQUENCY STABILITY

▪ **Low Frequency**

OPERATING FREQUENCY : 3555 MHz
REFERENCE VOLTAGE : 48 VDC
LIMIT : Within the authorized frequency band (3550 ~ 3700 MHz)

VOLTAGE (%)	POWER (V DC)	TEMP (℃)	FREQUENCY (MHz)	LIMIT (MHz)	MARGIN (MHz)
100%	48	+20(Ref)	3,550.259	3,550.000	0.2585
100%		-30	3,550.265	3,550.000	0.2649
100%		-20	3,550.266	3,550.000	0.2657
100%		-10	3,550.263	3,550.000	0.2625
100%		0	3,550.261	3,550.000	0.2611
100%		+10	3,550.260	3,550.000	0.2595
100%		+20	3,550.259	3,550.000	0.2585
100%		+30	3,550.259	3,550.000	0.2592
100%		+40	3,550.257	3,550.000	0.2569
100%		+50	3,550.254	3,550.000	0.2538
115%	55.20	+20	3,550.260	3,550.000	0.2599
85%	40.80	+20	3,550.259	3,550.000	0.2586

▪ **High Frequency**

OPERATING FREQUENCY : 3700 MHz
REFERENCE VOLTAGE : 48 VDC
LIMIT : Within the authorized frequency band (3550 ~ 3700 MHz)

VOLTAGE (%)	POWER (V DC)	TEMP (℃)	FREQUENCY (MHz)	LIMIT (MHz)	MARGIN (MHz)
100%	48	+20(Ref)	3,699.764	3,700.000	0.2365
100%		-30	3,699.786	3,700.000	0.2138
100%		-20	3,699.784	3,700.000	0.2165
100%		-10	3,699.780	3,700.000	0.2203
100%		0	3,699.769	3,700.000	0.2315
100%		+10	3,699.765	3,700.000	0.2350
100%		+20	3,699.764	3,700.000	0.2365
100%		+30	3,699.765	3,700.000	0.2355
100%		+40	3,699.761	3,700.000	0.2386
100%		+50	3,699.763	3,700.000	0.2372
115%	55.20	+20	3,699.761	3,700.000	0.2388
85%	40.80	+20	3,699.766	3,700.000	0.2341

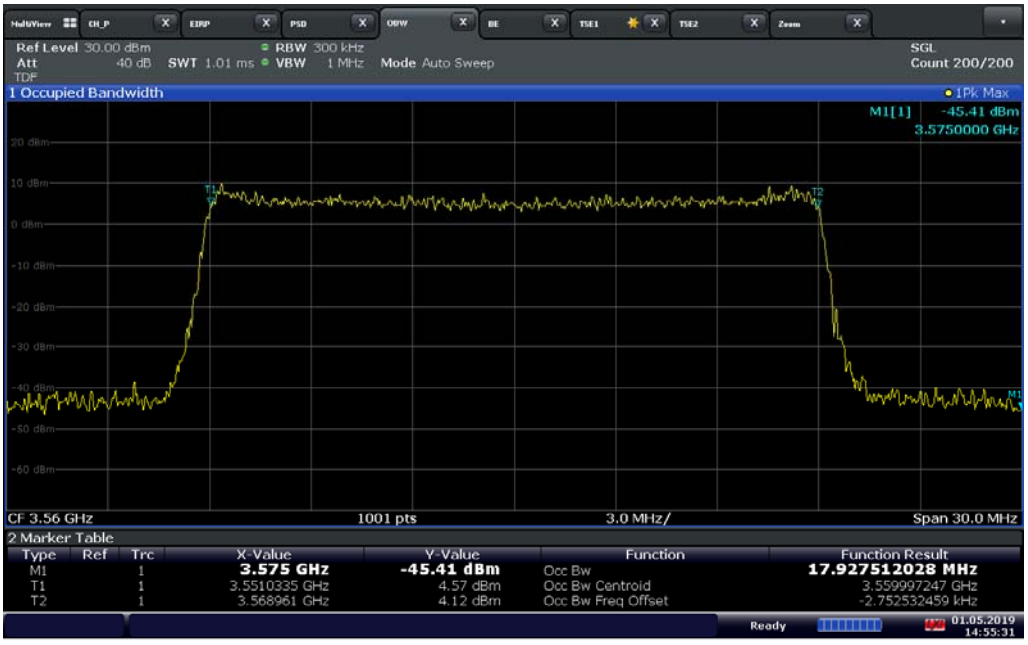
8. TEST PLOTS

Note: All bandwidths, RB configurations, and modulations were investigated.
The worst case test results are reported below.

8.1 OCCUPIED BANDWIDTH

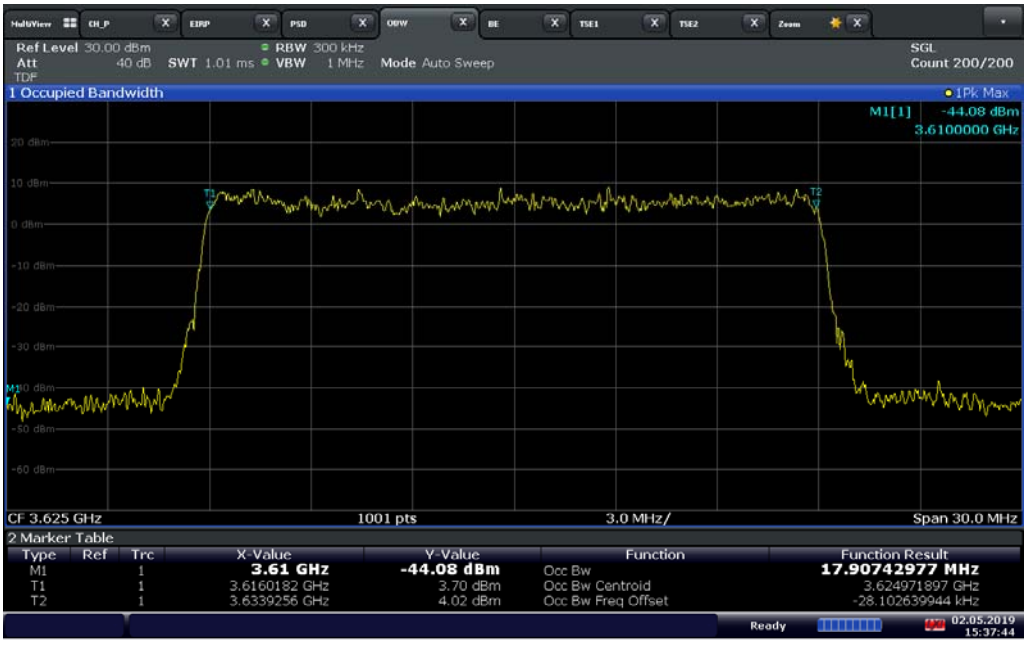
8.1.1 LTE Band 48

<Ant1>



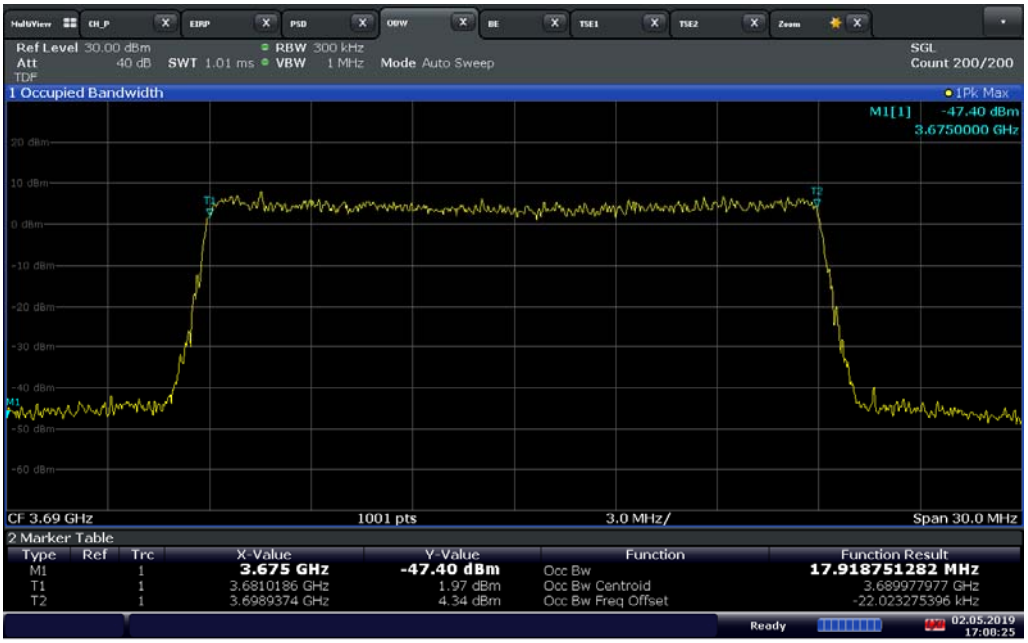
14:55:31 01.05.2019

LTE Band 48 / 20 MHz / QPSK



15:37:45 02.05.2019

LTE Band 48 / 20 MHz / 16QAM



17:08:26 02.05.2019

LTE Band 48 / 20 MHz / 64QAM

14:18:37 10.05.2019

LTE Band 48 / 10 MHz / QPSK

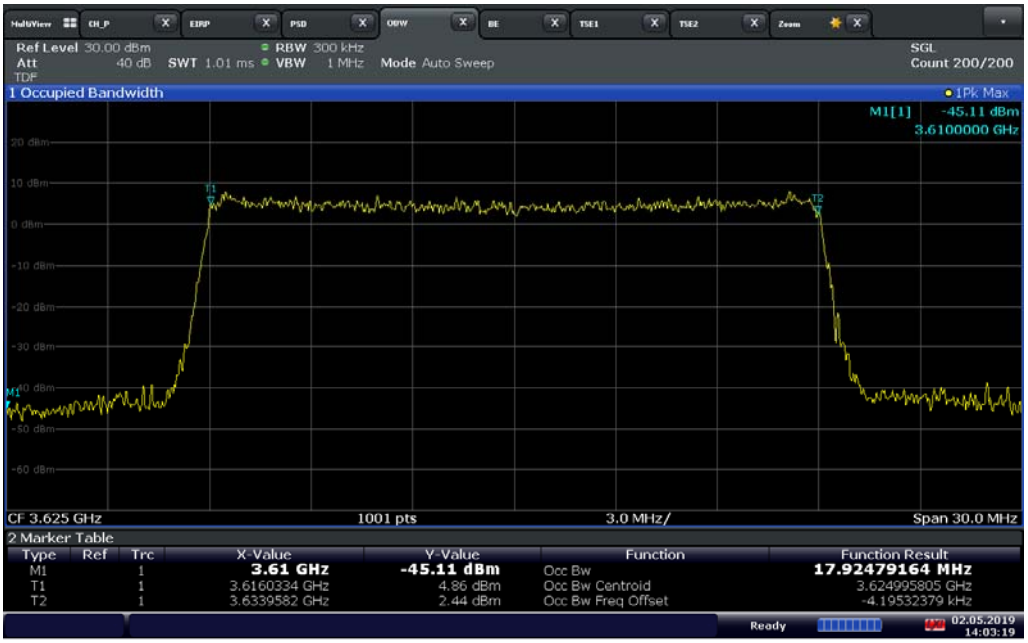
13:59:35 10.05.2019

LTE Band 48 / 10 MHz / 16QAM

13:42:23 10.05.2019

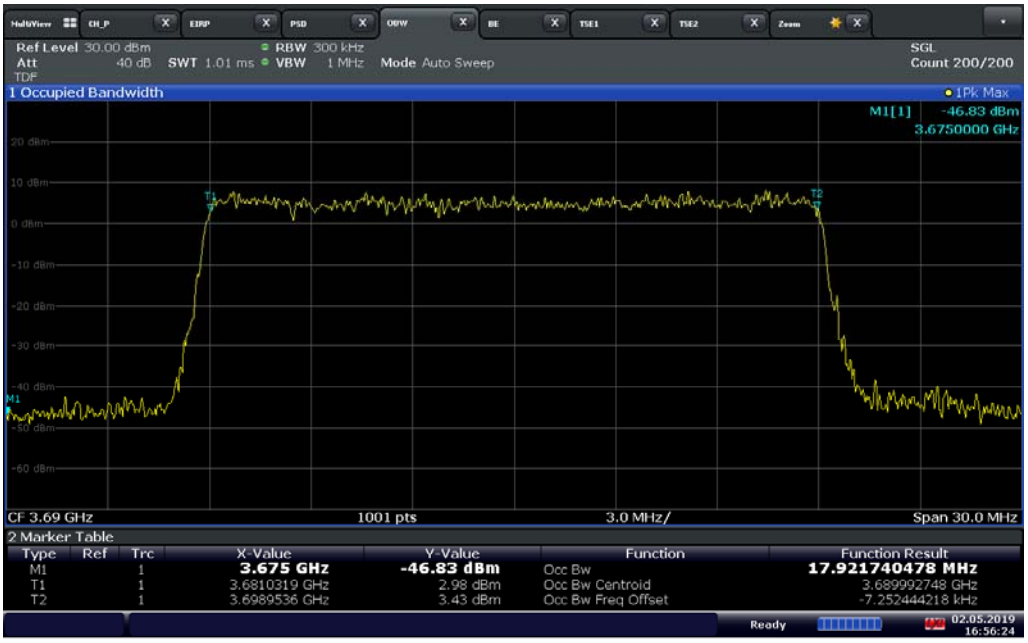
LTE Band 48 / 10 MHz / 64QAM

<Ant2>



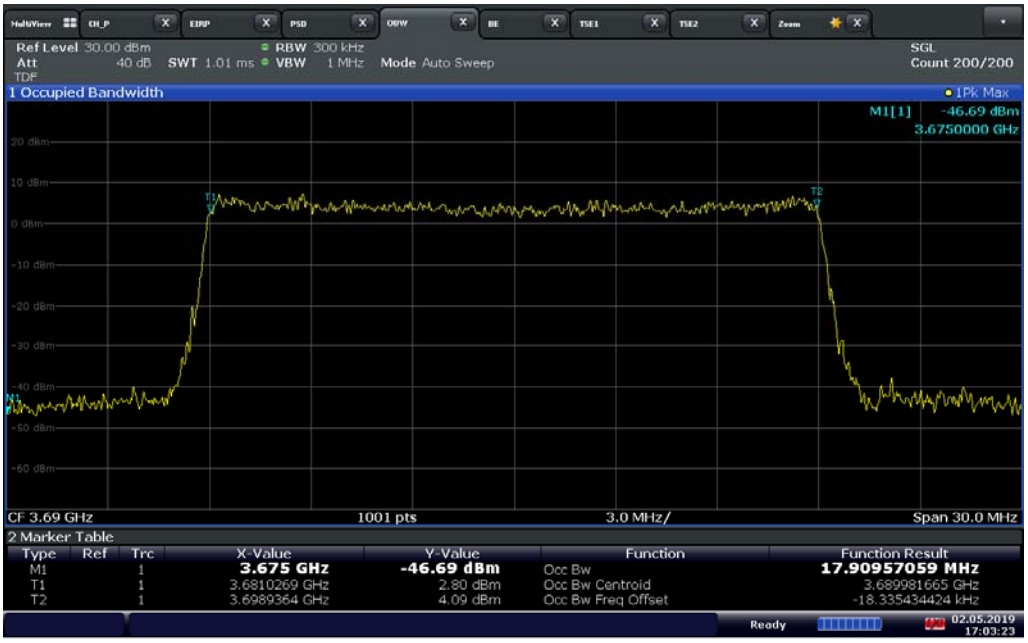
14:03:20 02.05.2019

LTE Band 48 / 20 MHz / QPSK



16:56:24 02.05.2019

LTE Band 48 / 20 MHz / 16QAM

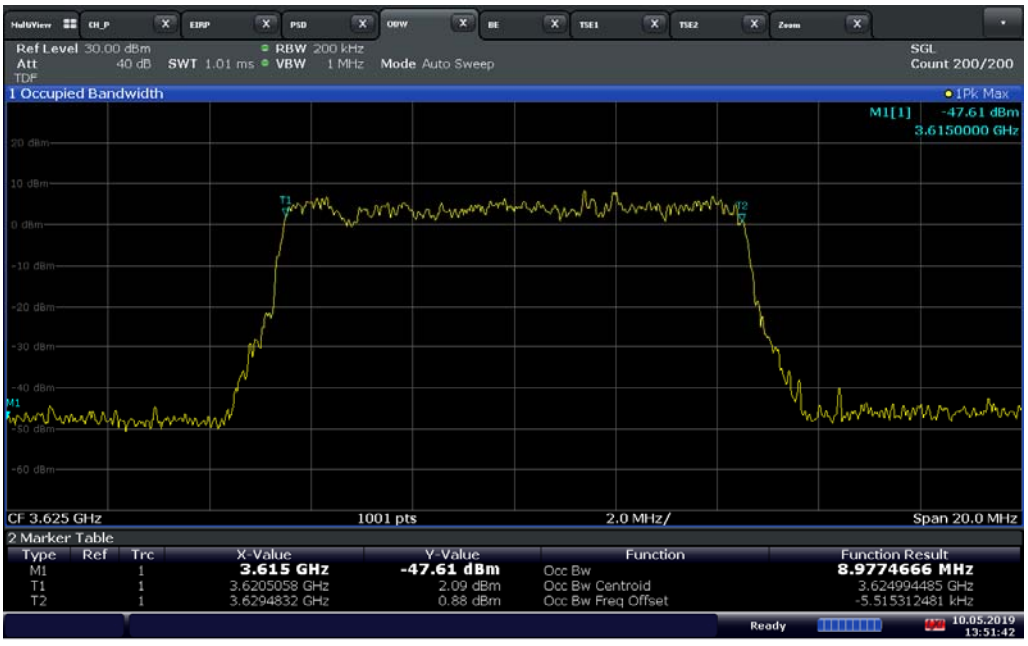


17:03:24 02.05.2019

LTE Band 48 / 20 MHz / 64QAM

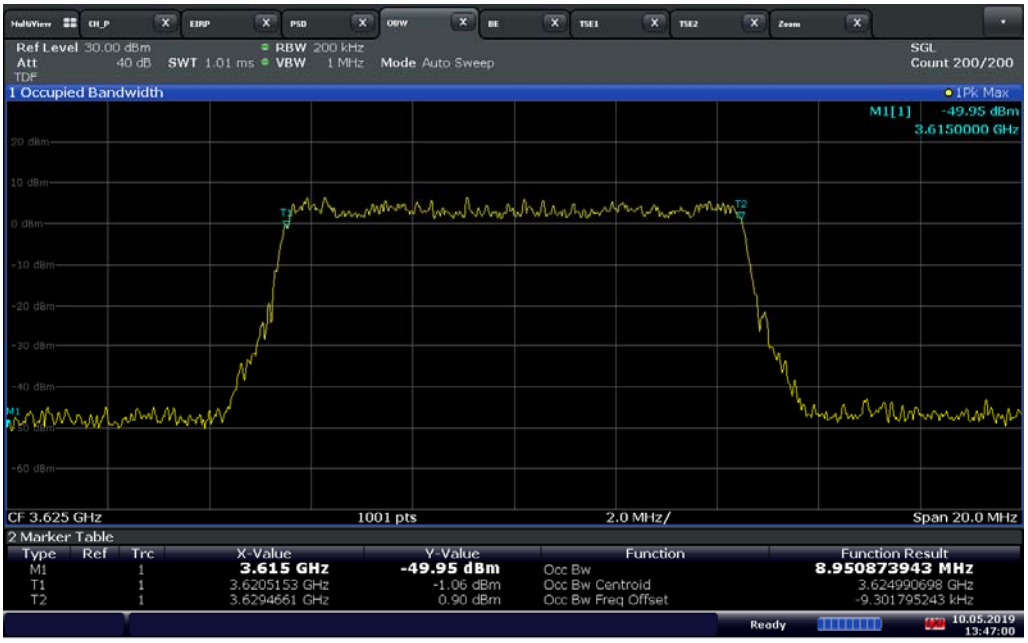
14:23:11 10.05.2019

LTE Band 48 / 10 MHz / QPSK



13:51:43 10.05.2019

LTE Band 48 / 10 MHz / 16QAM

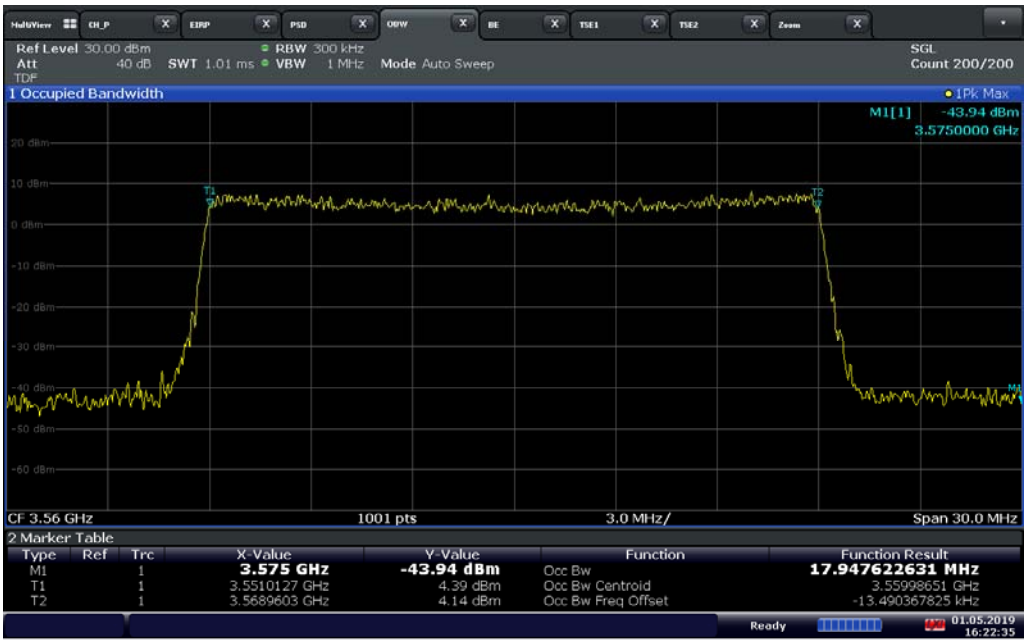


13:47:00 10.05.2019

LTE Band 48 / 10 MHz / 64QAM

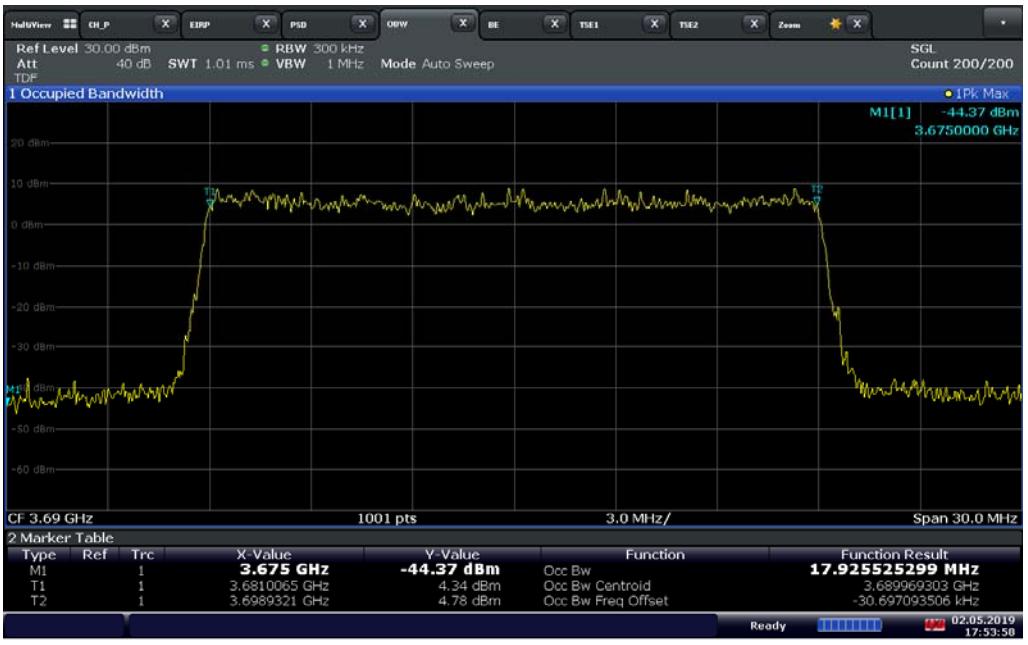
8.1.2 LTE Band 48

<Ant3>



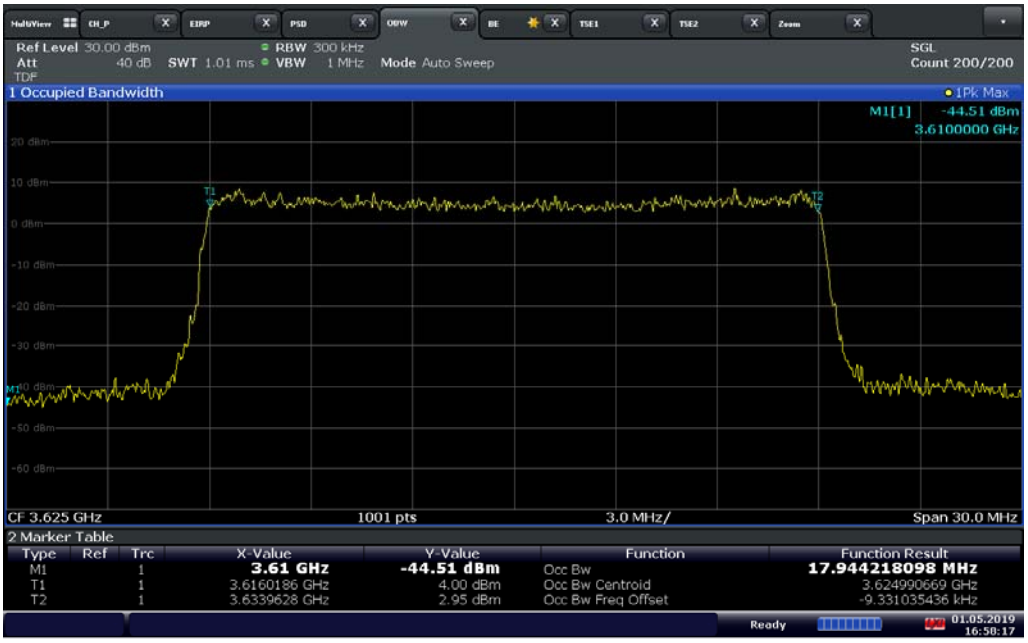
16:22:35 01.05.2019

LTE Band 48 / 20 MHz / QPSK



17:53:59 02.05.2019

LTE Band 48 / 20 MHz / 16QAM



16:58:17 01.05.2019

LTE Band 48 / 20 MHz / 64QAM

12:22:00 10.05.2019

LTE Band 48 / 10 MHz / QPSK

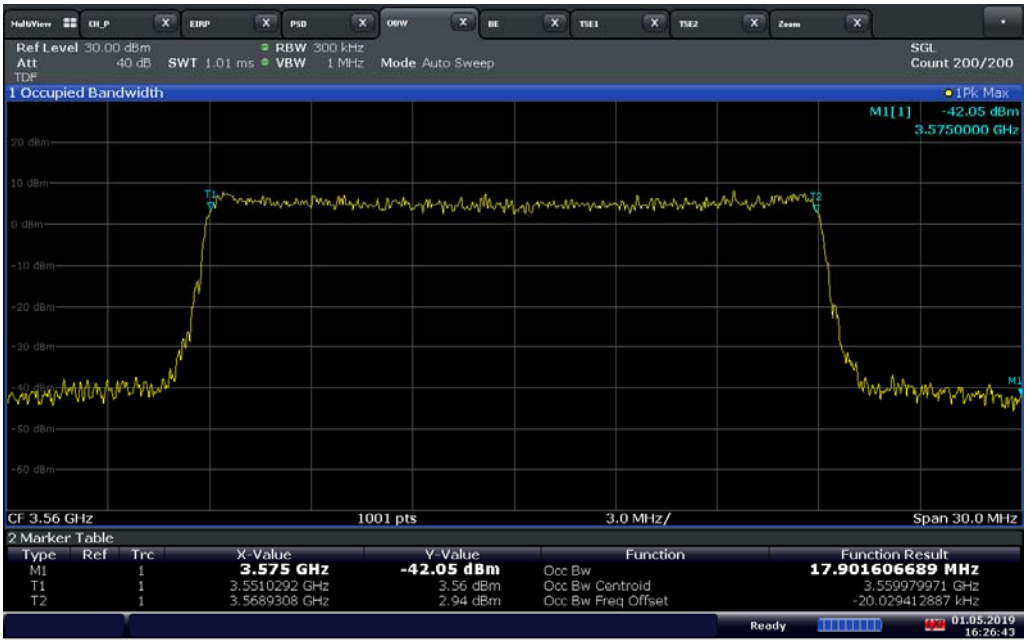
12:33:31 10.05.2019

LTE Band 48 / 10 MHz / 16QAM

10:56:30 10.05.2019

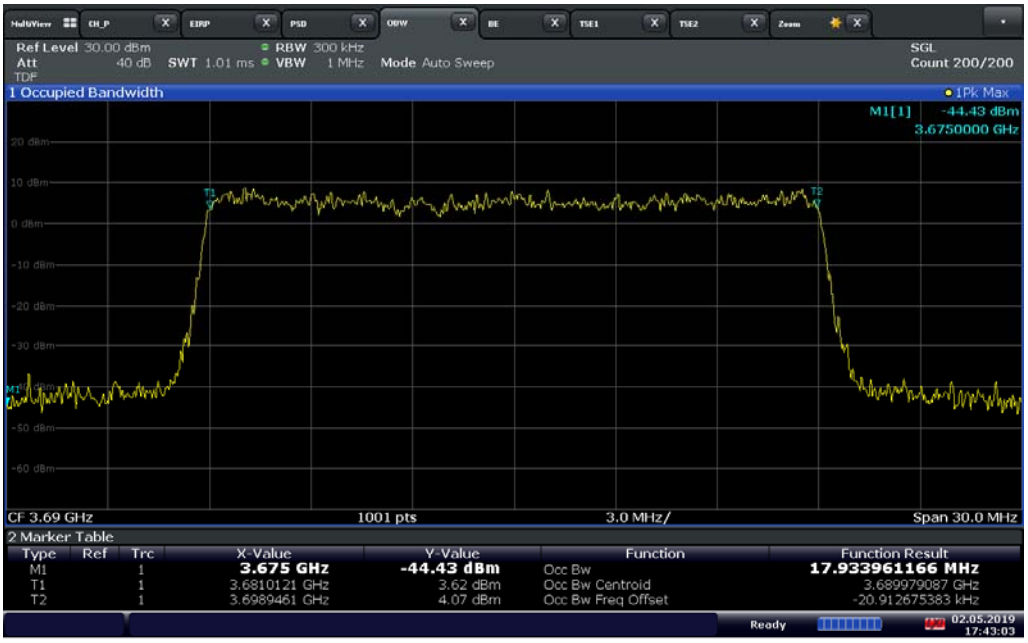
LTE Band 48 / 10 MHz / 64QAM

<Ant4>



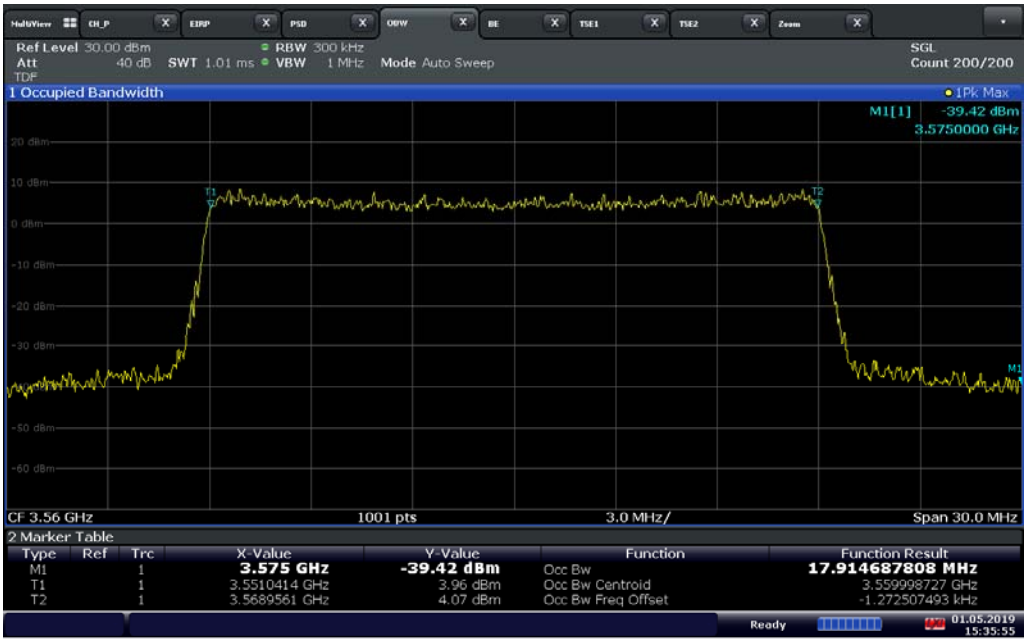
16:26:44 01.05.2019

LTE Band 48 / 20 MHz / QPSK



17:43:04 02.05.2019

LTE Band 48 / 20 MHz / 16QAM



15:35:56 01.05.2019

LTE Band 48 / 20 MHz / 64QAM

12:18:52 10.05.2019

LTE Band 48 / 10 MHz / QPSK

15:55:52 10.05.2019

LTE Band 48 / 10 MHz / 16QAM

16:14:45 10.05.2019

LTE Band 48 / 10 MHz / 64QAM

8.1.3 LTE Band 48 (UL-CA, intra-band_continuous)

<ANT1>

17:32:14 21.05.2019

LTE CA intra-band 48 / 20(10+10) / QPSK

17:38:11 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 16QAM

18:38:15 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 64QAM

<ANT2>

19:57:38 21.05.2019

LTE CA intra-band 48 / 20(10+10) / QPSK

17:41:19 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 16QAM

18:35:12 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 64QAM

<ANT3>

16:03:49 21.05.2019

LTE CA intra-band 48 / 20(10+10) / QPSK

19:35:47 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 16QAM

19:14:09 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 64QAM

<ANT4>

20:07:16 21.05.2019

LTE CA intra-band 48 / 20(10+10) / QPSK

17:49:04 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 16QAM

15:35:47 21.05.2019

LTE CA intra-band 48 / 20(10+10) / 64QAM

<ANT1>

14:57:05 24.05.2019

LTE CA intra-band 48 / 30(10+20) / QPSK

14:07:50 24.05.2019

LTE CA intra-band 48 / 30(10+20) / 16QAM

LTE CA intra-band 48 / 30(10+20) / 64QAM

<ANT2>

15:21:30 24.05.2019

LTE CA intra-band 48 / 30(10+20) / QPSK

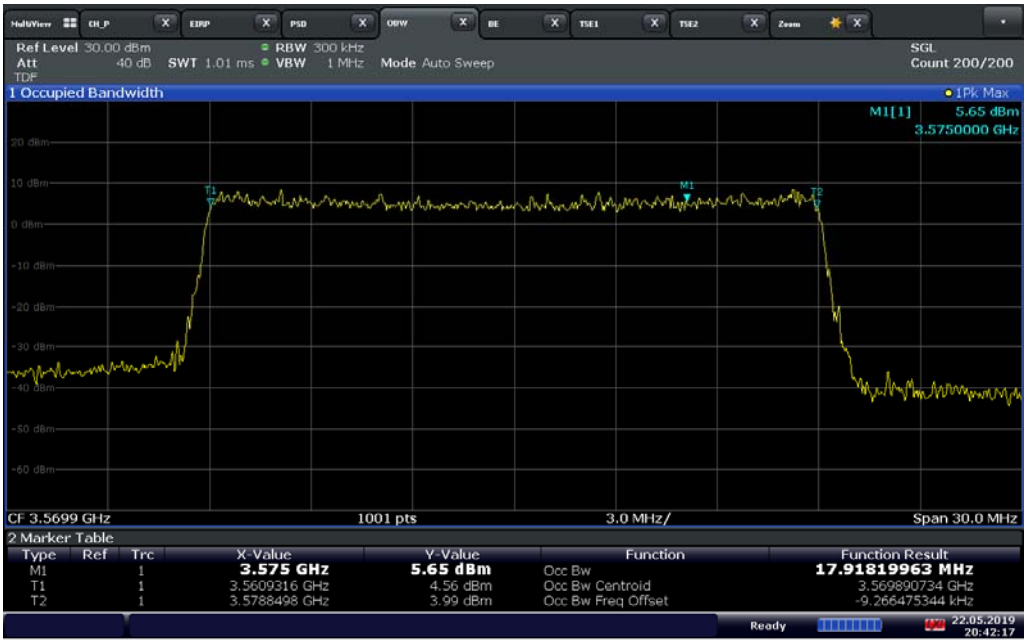
10:06:14 24.05.2019

LTE CA intra-band 48 / 30(10+20) / 16QAM

13:45:32 24.05.2019

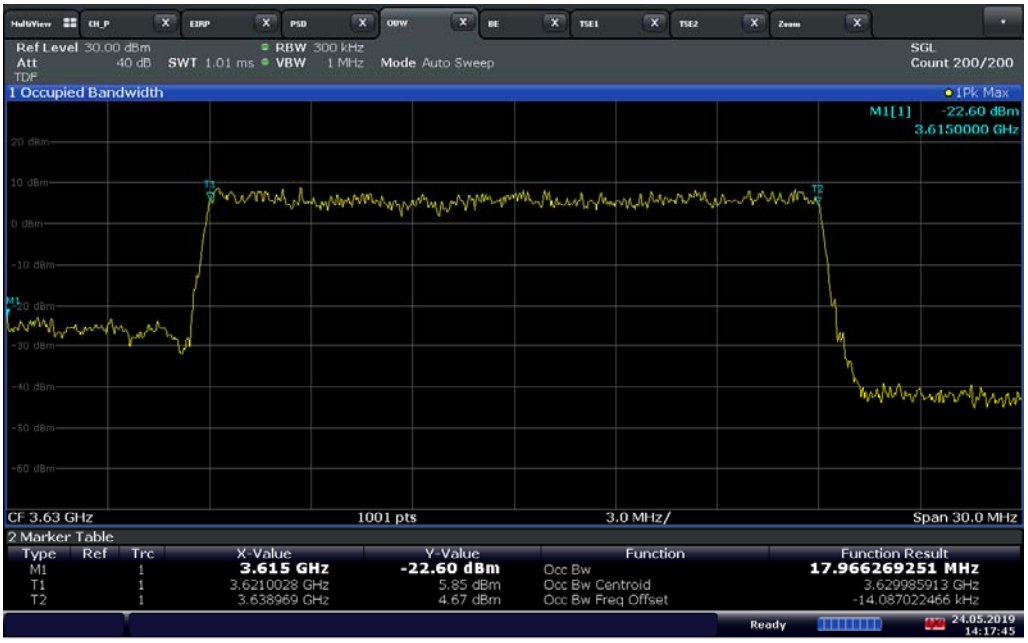
LTE CA intra-band 48 / 30(10+20) / 64QAM

<ANT3>



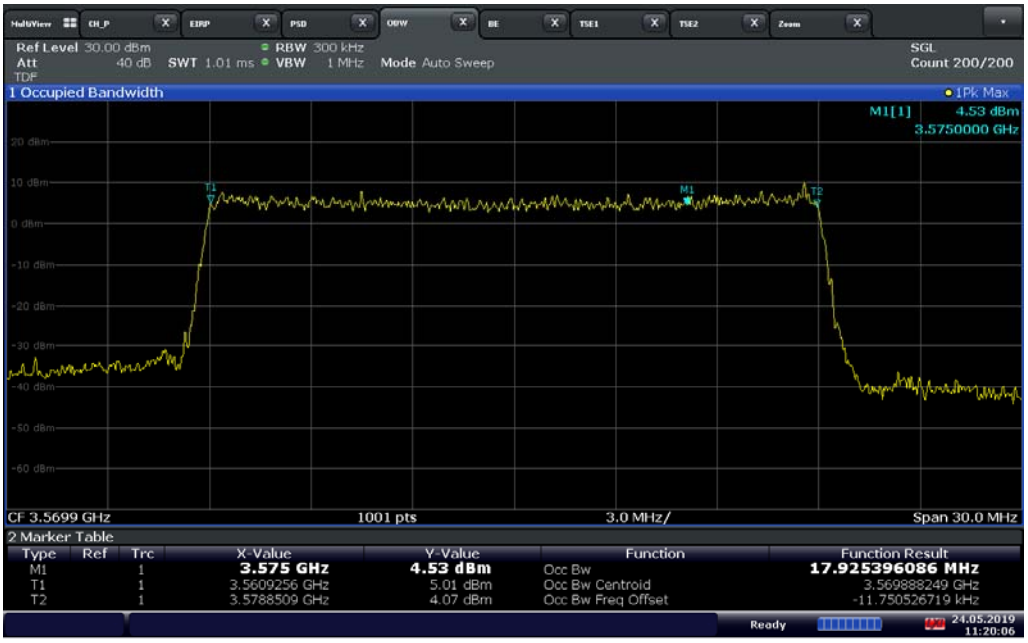
20:42:17 22.05.2019

LTE CA intra-band 48 / 30(10+20) / QPSK



14:17:46 24.05.2019

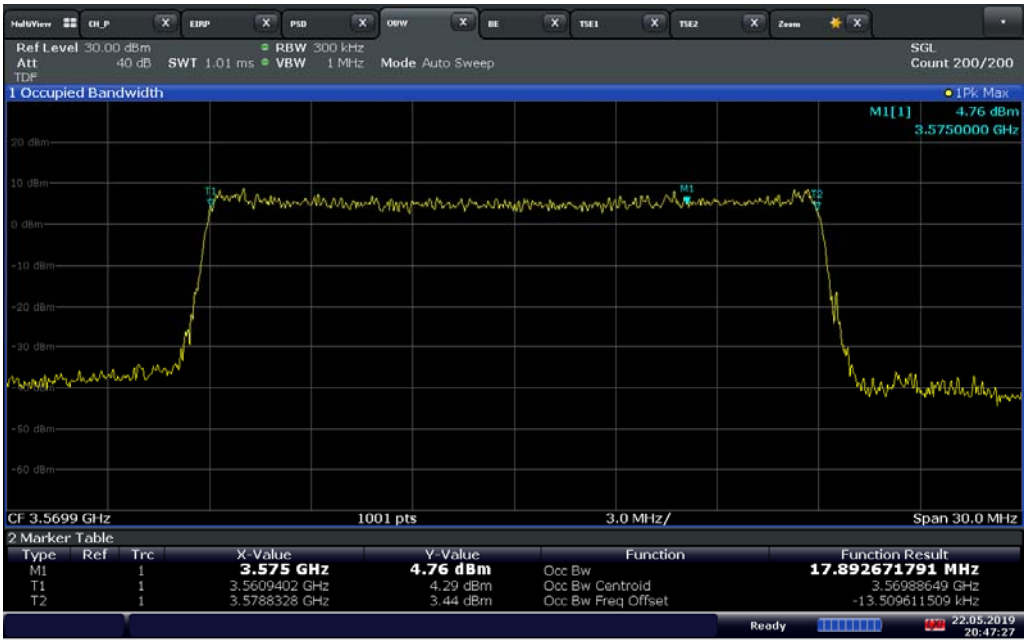
LTE CA intra-band 48 / 30(10+20) / 16QAM



11:20:07 24.05.2019

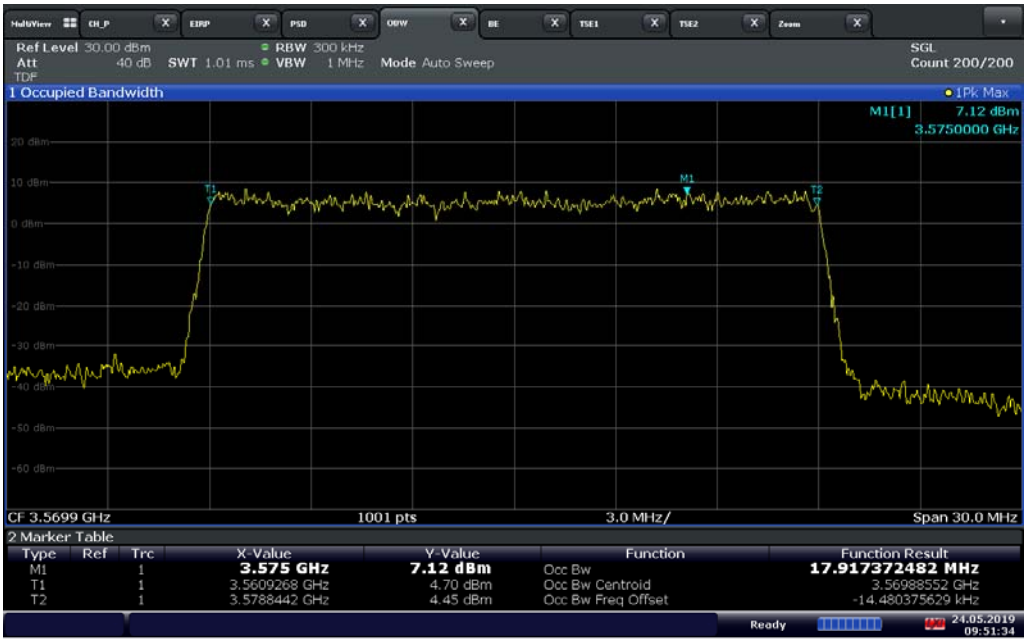
LTE CA intra-band 48 / 30(10+20) / 64QAM

<ANT4>



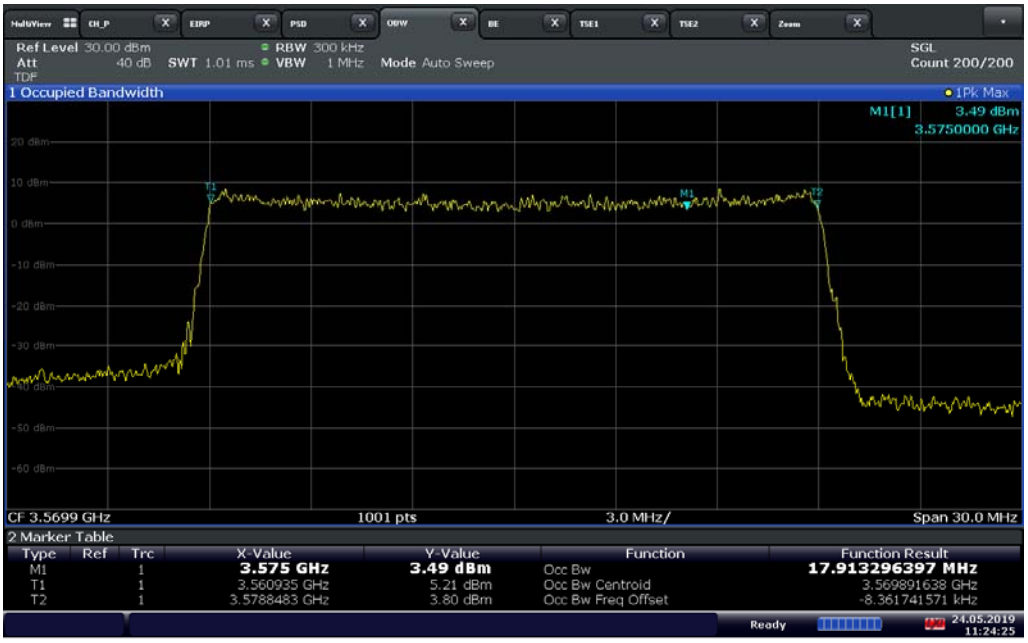
20:47:28 22.05.2019

LTE CA intra-band 48 / 30(10+20) / QPSK



09:51:35 24.05.2019

LTE CA intra-band 48 / 30(10+20) / 16QAM



11:24:26 24.05.2019

LTE CA intra-band 48 / 30(10+20) / 64QAM

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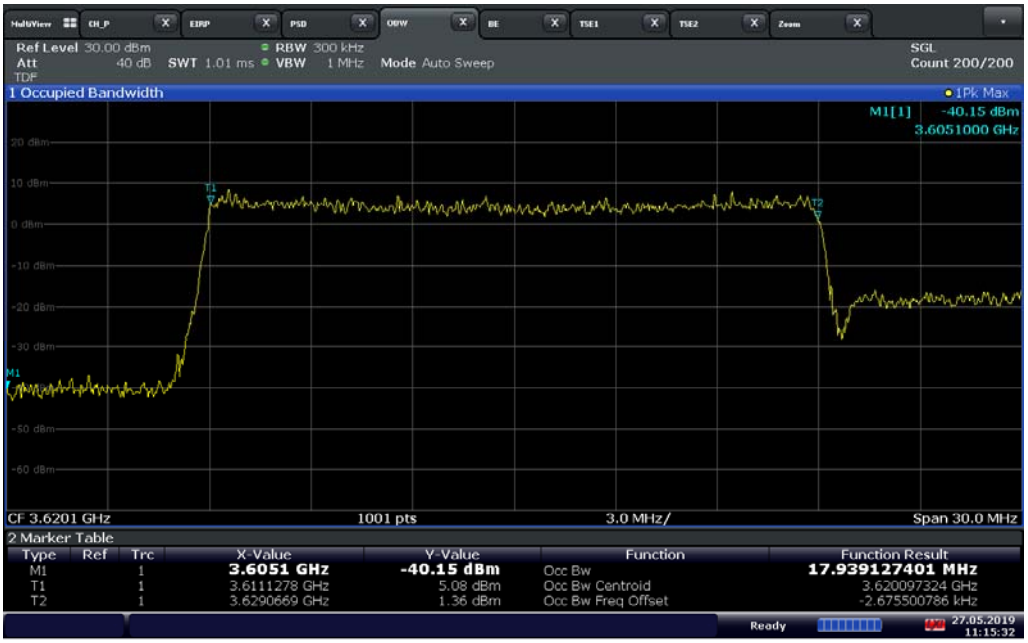
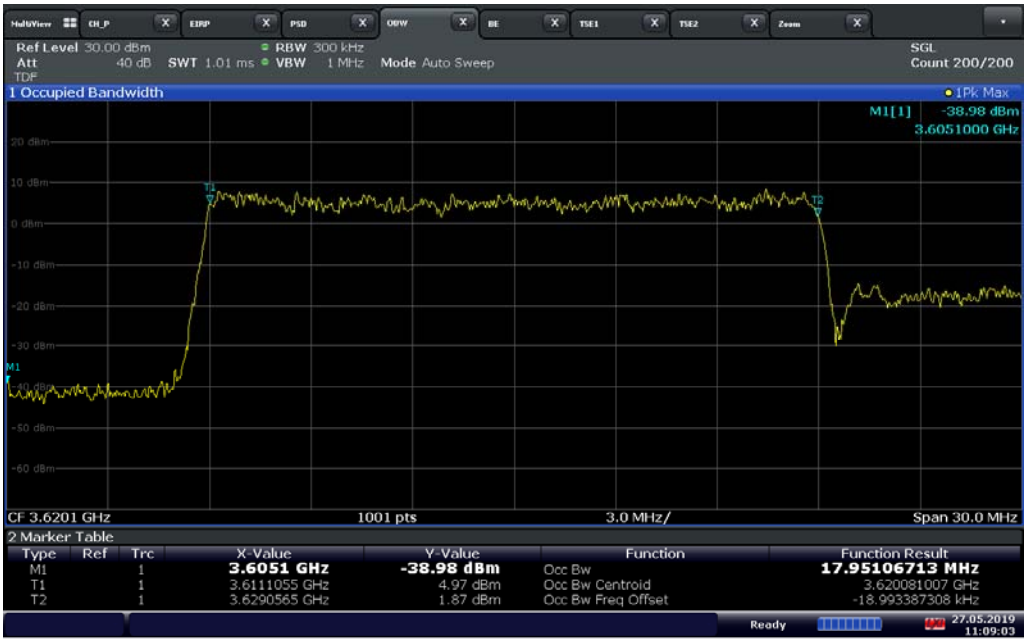


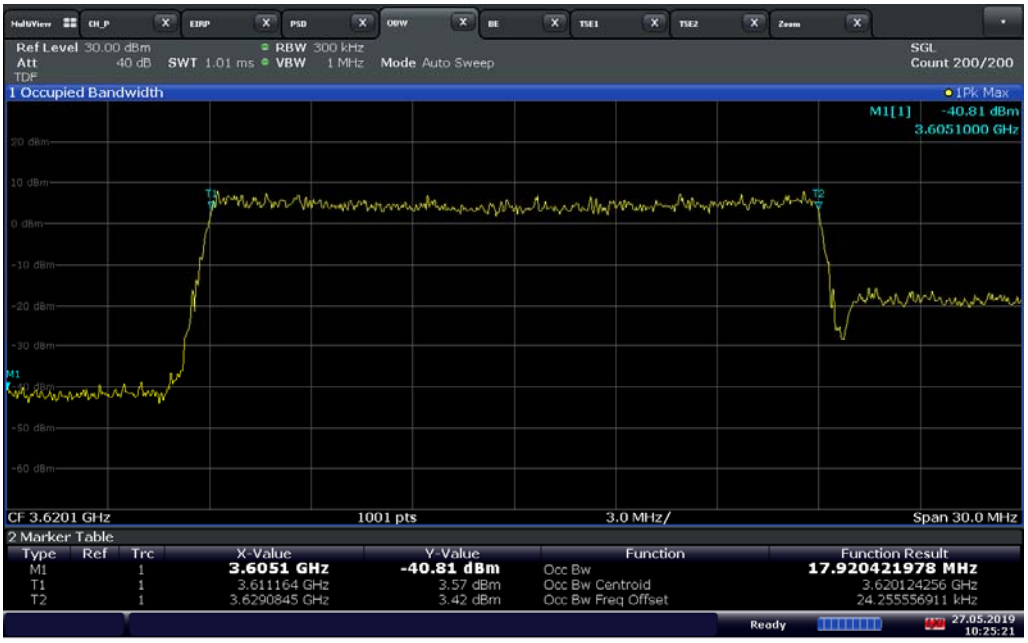
11:15:33 27.05.2019

LTE CA intra-band 48 / 30(20+10) / QPSK



11:09:03 27.05.2019

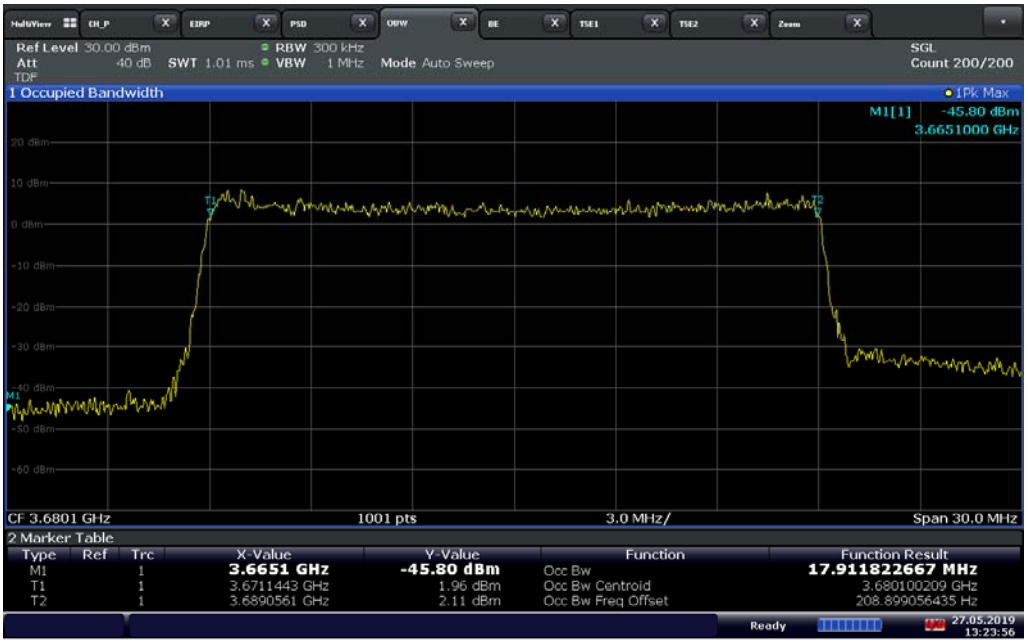
LTE CA intra-band 48 / 30(20+10) / 16QAM



10:25:21 27.05.2019

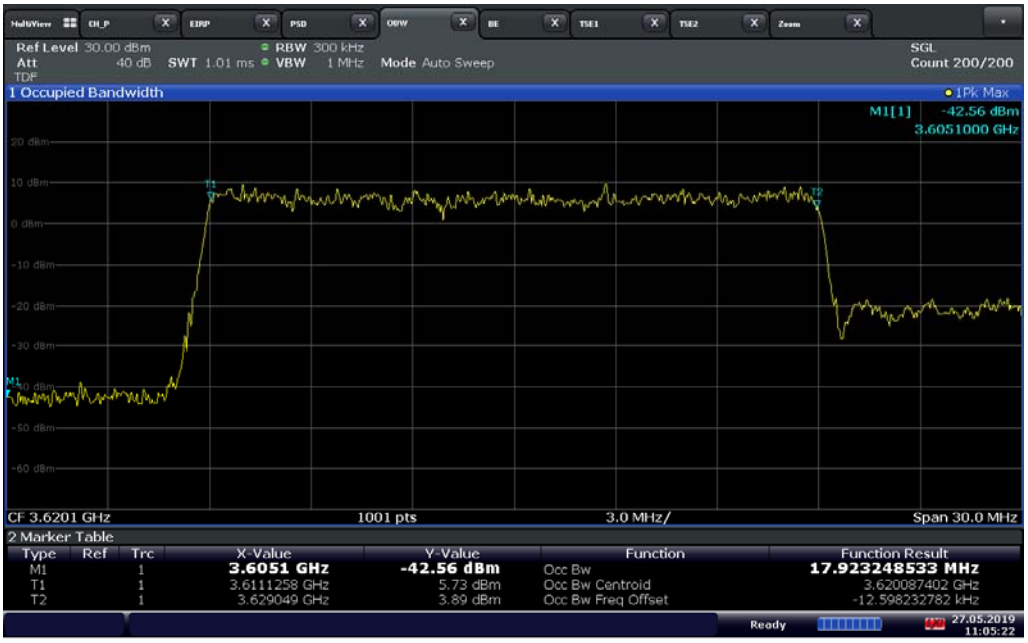
LTE CA intra-band 48 / 30(20+10) / 64QAM

<ANT2>



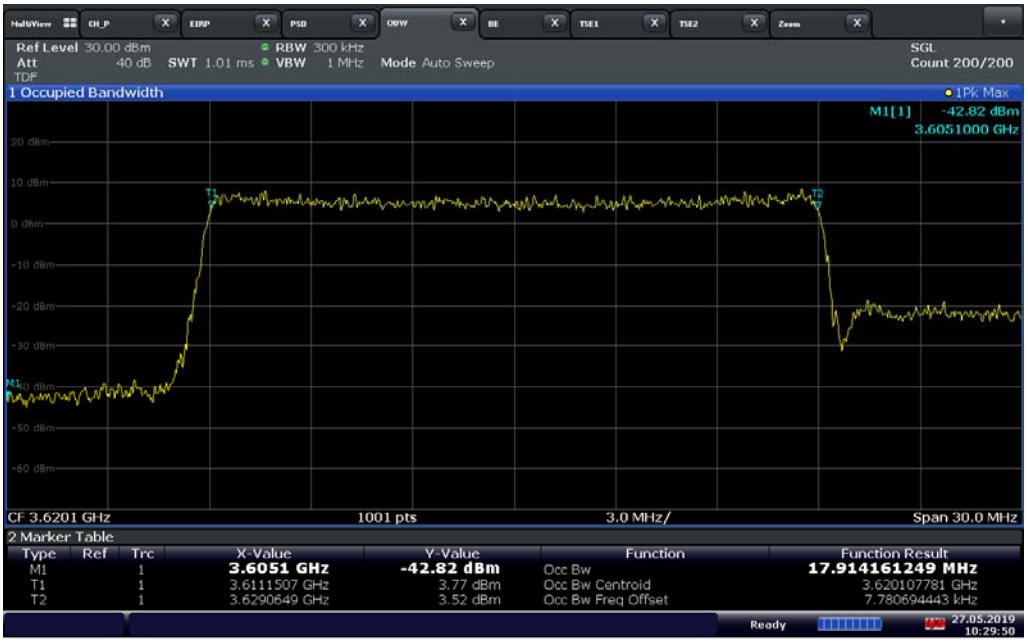
13:23:56 27.05.2019

LTE CA intra-band 48 / 30(20+10) / QPSK



11:05:22 27.05.2019

LTE CA intra-band 48 / 30(20+10) / 16QAM



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LTE CA intra-band 48 / 30(20+10) / 64QAM

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09:26:59 27.05.2019

LTE CA intra-band 48 / 30(20+10) / QPSK

09:52:22 27.05.2019

LTE CA intra-band 48 / 30(20+10) / 16QAM

10:37:59 27.05.2019

LTE CA intra-band 48 / 30(20+10) / 64QAM

<ANT4>

11:27:59 27.05.2019

LTE CA intra-band 48 / 30(20+10) / QPSK

14:22:00 27.05.2019

LTE CA intra-band 48 / 30(20+10) / 16QAM

10:41:52 27.05.2019

LTE CA intra-band 48 / 30(20+10) / 64QAM

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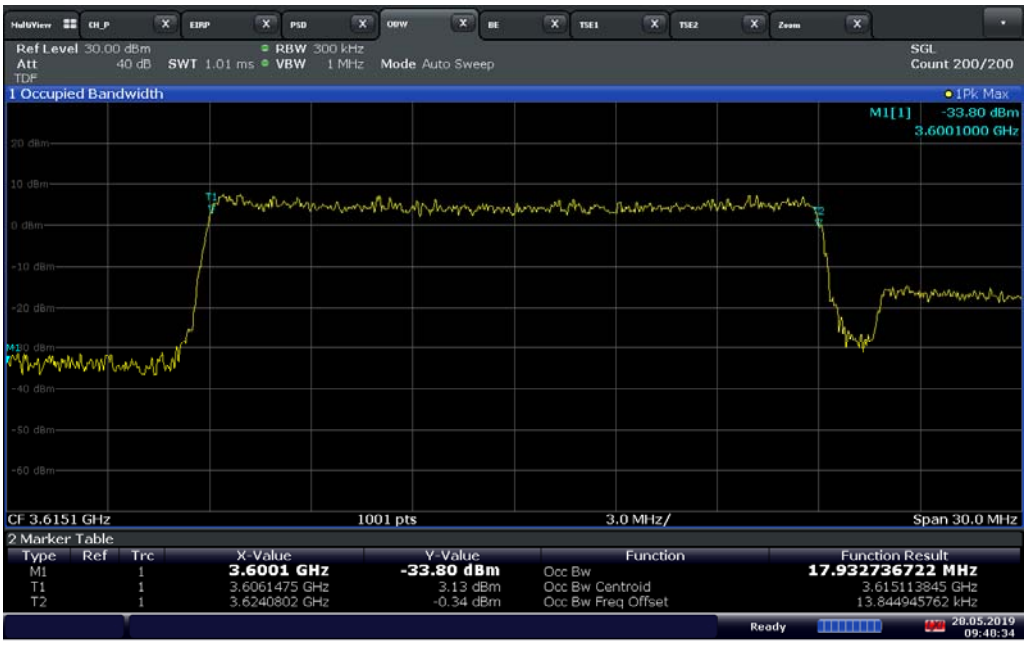

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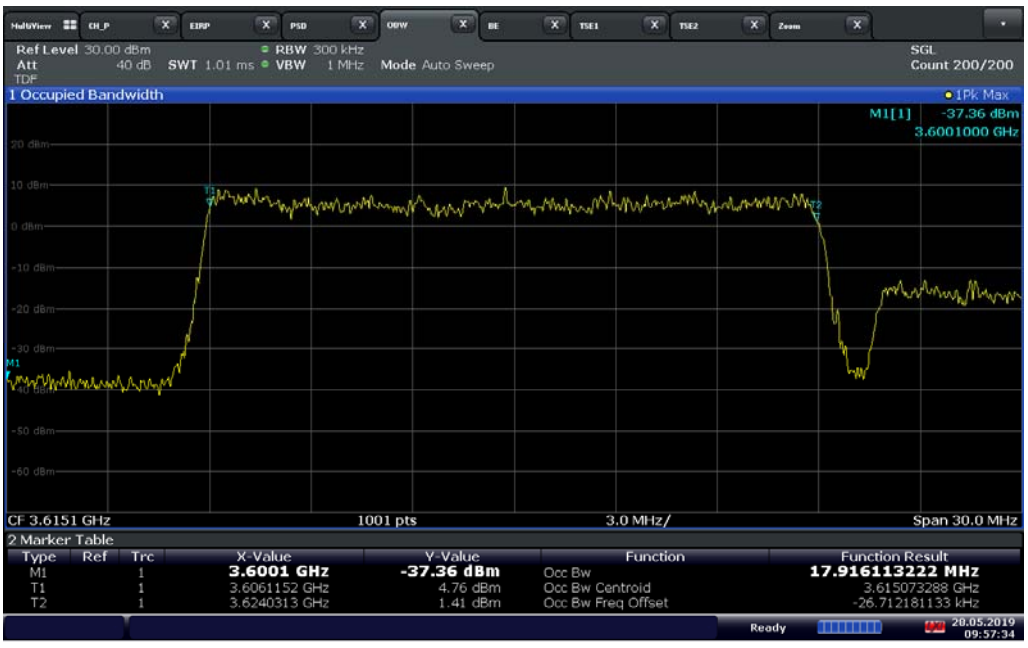
LTE CA intra-band 48 / 40(20+20) / QPSK



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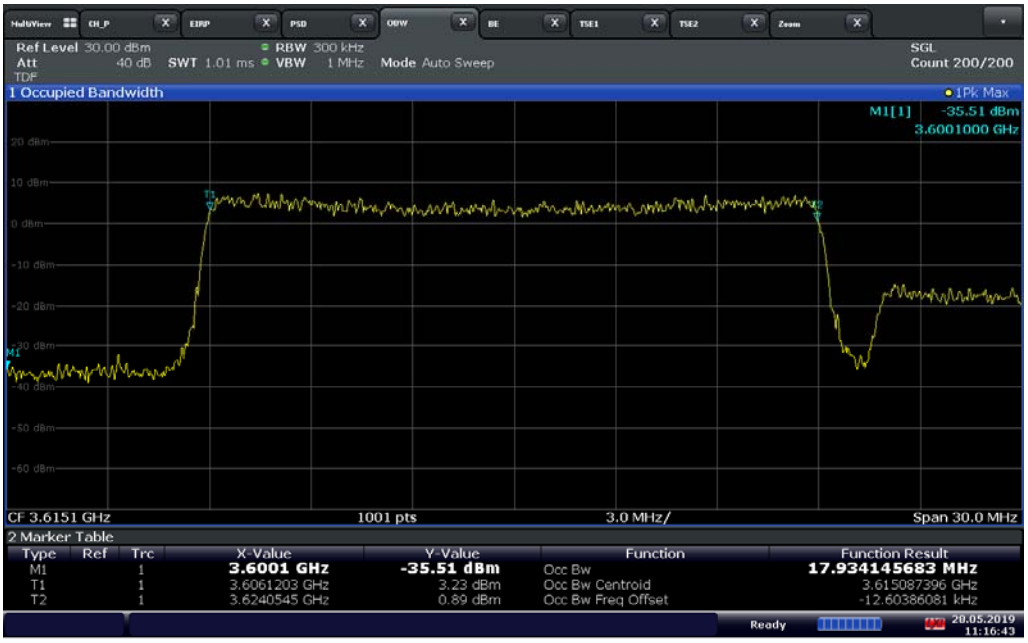

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LTE CA intra-band 48 / 40(20+20) / 64QAM

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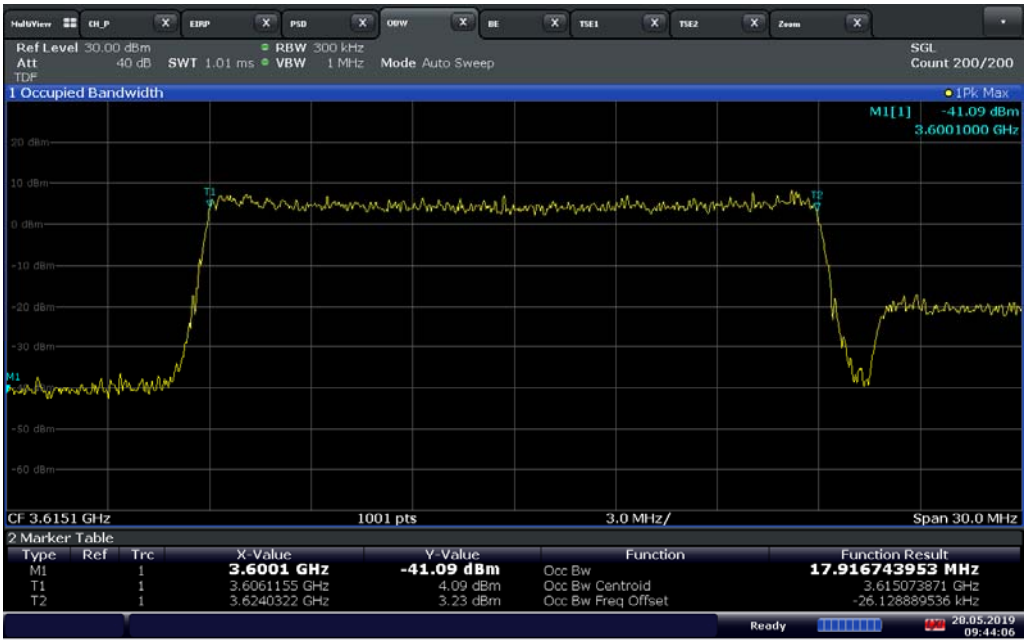

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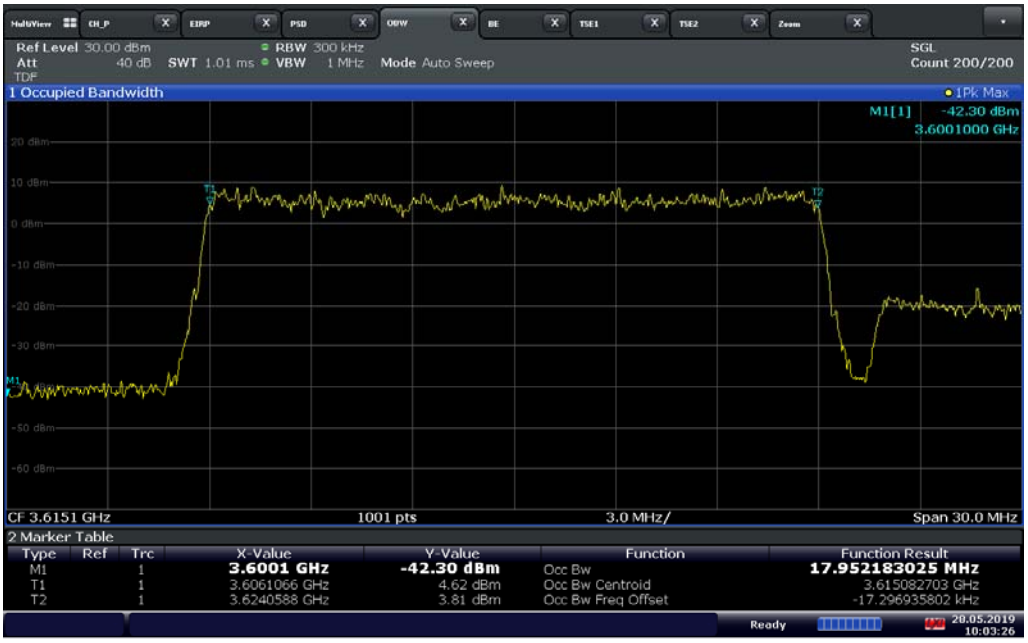

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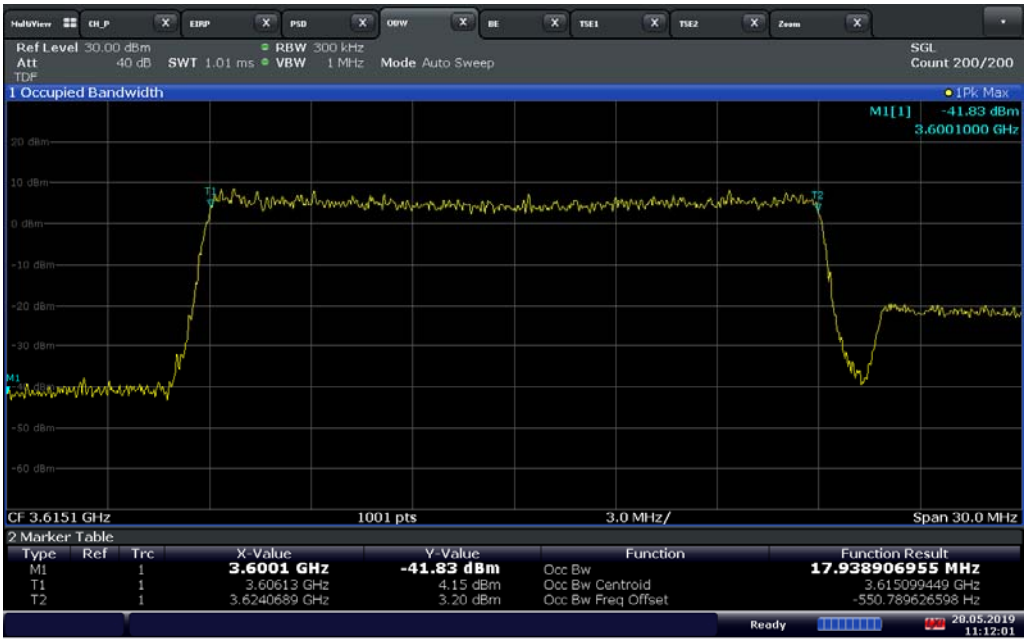

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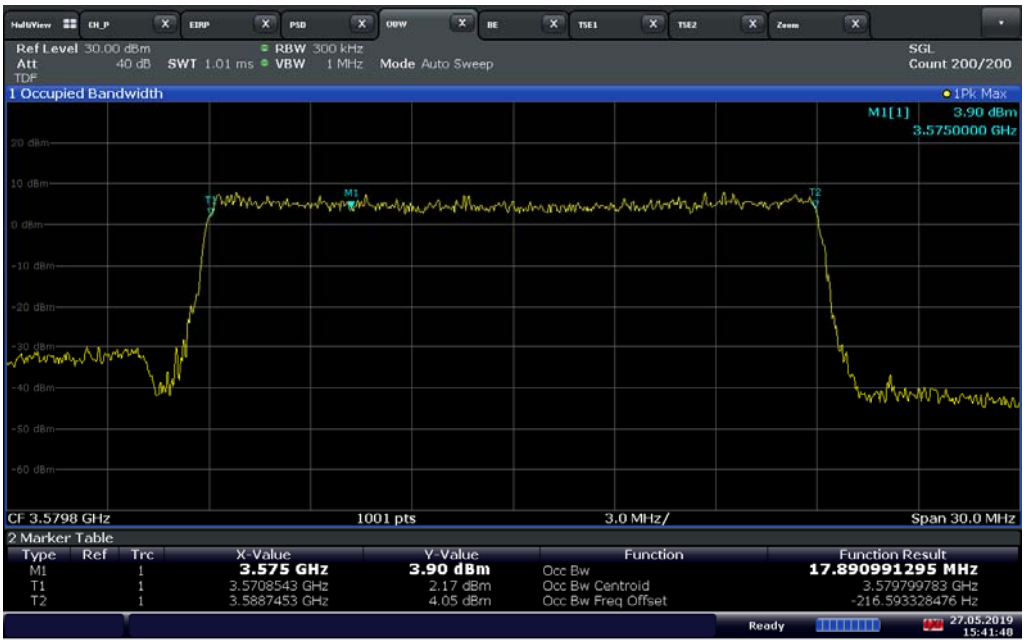

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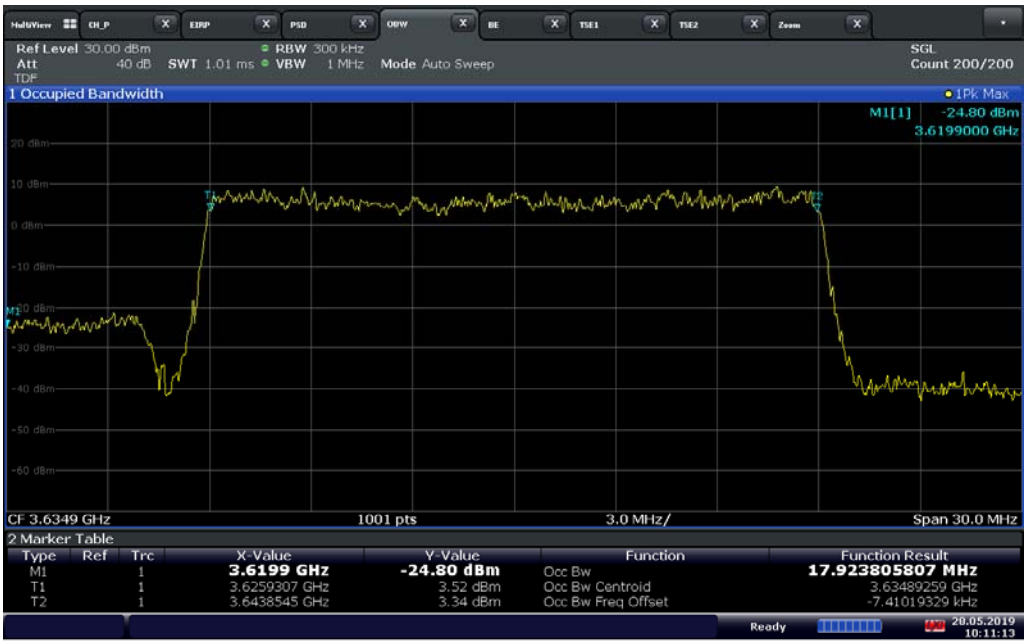

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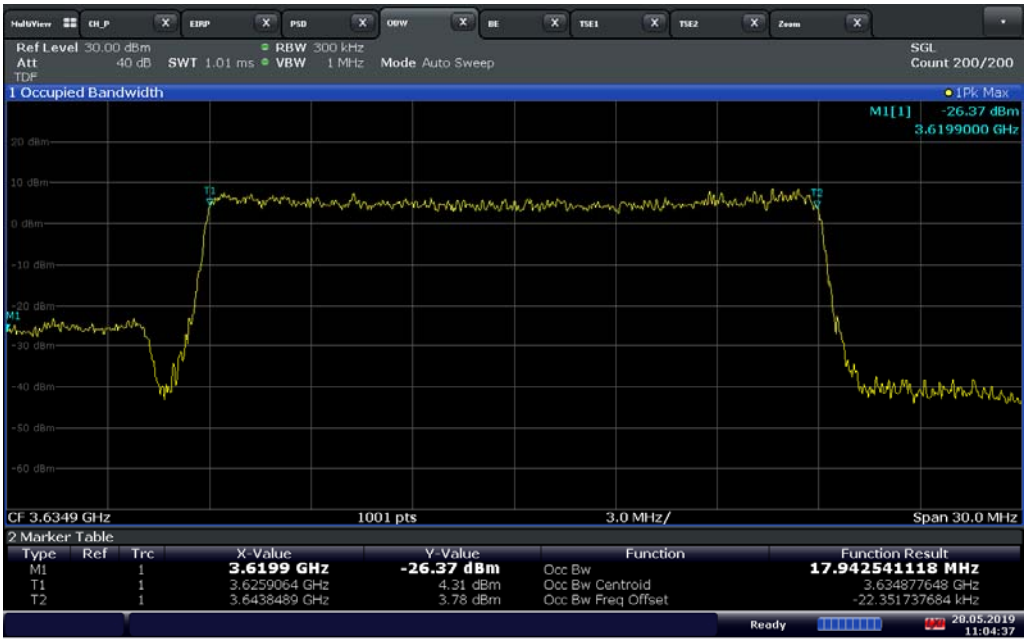

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LTE CA intra-band 48 / 40(20+20) / 64QAM

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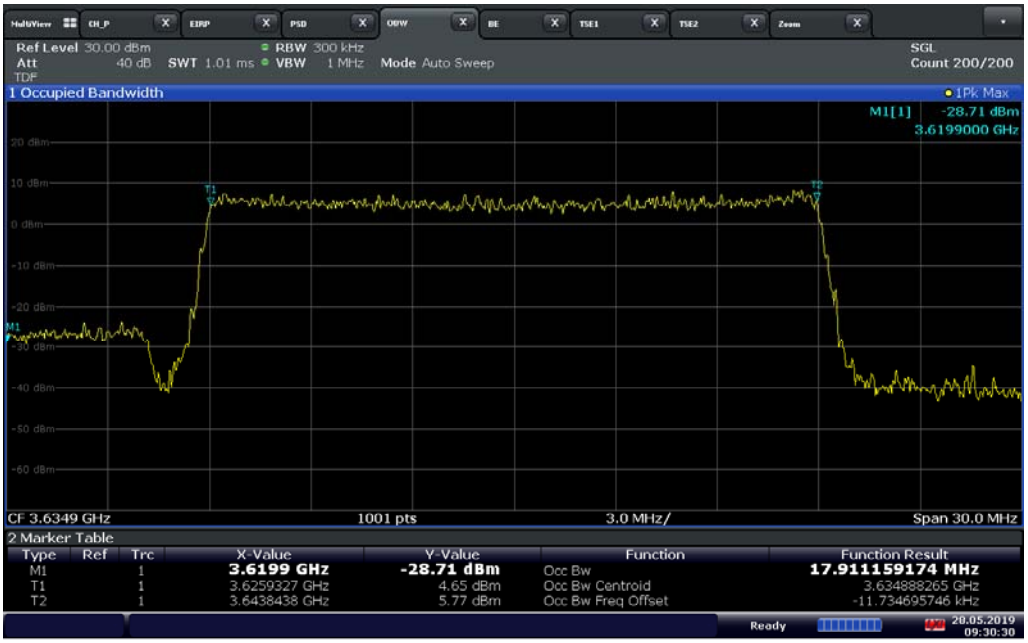

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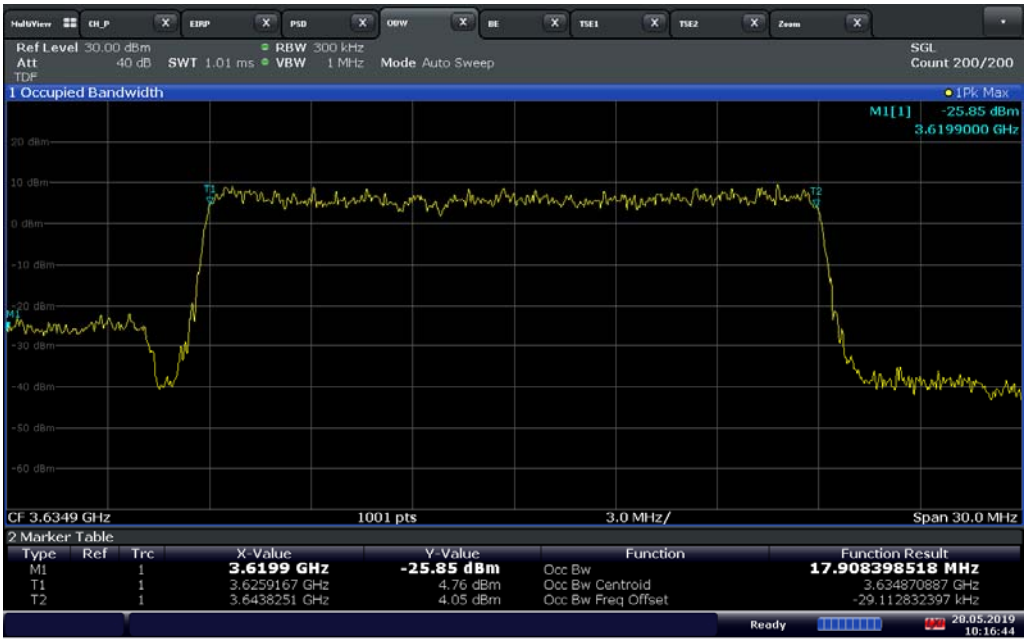
LTE CA intra-band 48 / 40(20+20) / QPSK



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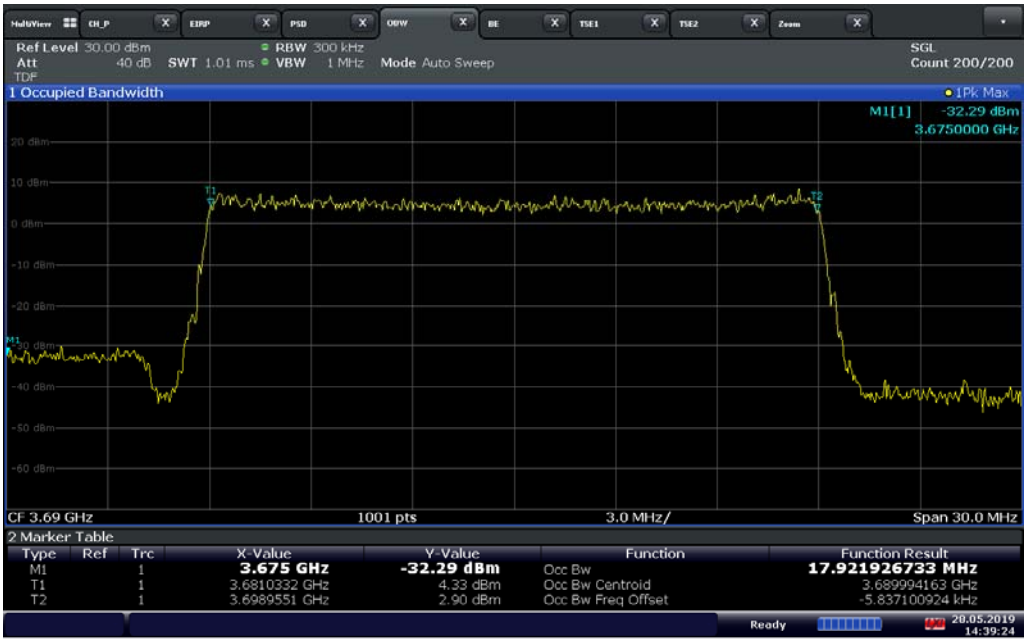
LTE CA intra-band 48 / 40(20+20) / 16QAM



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LTE CA intra-band 48 / 40(20+20) / 64QAM